SWIB Board Meeting of March 29, 2023

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AGENDA / NOTICE

SWIB STATE OF WISCONSIN INVESTMENT BOARD

Name of Meeting:	**Regular Meeting of the Board of Trustees**
Date/Time:	Tuesday, March 28, 2023 5:30 pm
Location:	The Madison Club
Address:	5 E. Wilson Street, Madison WI 53703

OPEN SESSION
Dinner* The Madison Club 5 E. Wilson Street, Madison, WI Adjourn until Wednesday, March 29, 2023

*The Dinner is open to the public. ***If a member of the public wishes to attend, please notify SWIB at 608-261-9341 or email dawn.tuescher@swib.state.wi.us on or before March 28th.***

Name of Meeting: **Regular Meeting of the Board of Trustees**
Date/Time: Wednesday, March 29, 2023 Approximately 10:45 am (following Audit)
Room: Board Room, 2nd Floor
Address: 121 E. Wilson St., Madison WI 53703

OPEN SESSION
1. Opening Remarks
2. Committee Reports – Open Session Items A. Strategic Planning and Corporate Governance Committee B. Benchmark and Performance Committee C. Audit and Finance Committee D. Compensation and Workforce Development Committee
3. Consent Agenda A. Open Session Minutes of December 14, 2022 B. Recommended Actions from Committee Agendas – Open Session Items
4. Election of Secretary and Assistant Secretary
5. Annual Committee Assignments by Board Chair
6. Proposed 2024 Board Meeting Dates
7. Investment Performance and Market Updates A. Board Investment Performance Report, Q4 2022 B. 2022 Callan Report
8. Asset Allocation Update
9. Committee Open Session Business A. Amendments to WRS Investment Committee Investment Guidelines B. Approved Open Session Investment Committee Meeting Minutes of November 22, 2022; December 15, 2022; and January 24, 2023 C. Final Open Session Agenda for February 23, 2023 and Draft Open Session Agendas for March 30 and April 25, 2023 D. Draft Open Session Minutes of November 30, 2022 Enterprise Risk and Compliance Committee meeting
10. Quarterly Investment Update, Q4 2022

CLOSED SESSION*
RECONVENE IN OPEN SESSION
11. Announcement of Matters Taken Up in Closed Session
12. In the Absence of Questions, the Following Reports will be Filed Without Comment (For informational purposes): A. Quarterly Charges to Funds Reports, Q4 2022 B. Private Markets and Funds Alpha Commitments, Q4 2022 C. Board Contact Log
13. Future Items for Discussion A. Annual Board Agenda Plan
14. Motion to Recess
NOTES: Items may be taken in order other than listed. *Estimated times are for planning purposes only. Agenda items will last until discussion is concluded.* *The meeting site is physical accessible. Upon prior request, reasonable accommodations will be provided.*

OPEN SESSION
Optional Building Tour* Adjourn

The tour is open to the public at 4703 Madison Yards Way.* ***If a member of the public wishes to attend, please notify SWIB at 608-261-9341 or email dawn.tuescher@swib.state.wi.us on or before March 28th*

* The motion to go into closed session at this meeting is made pursuant to (i) Sections 19.36(5) and 19.85(1)(e) of the Wisconsin Statutes to (a) consider confidential and proprietary strategies for the investment of public funds relating to specific proprietary investment strategies of internal WRS portfolios and risk management, and (b) approve prior closed session minutes that discuss the same; (ii) Section 19.85(1)(c) of the Wisconsin Statutes to discuss the performance evaluation and compensation data of specific SWIB employees; and (iii) Section 19.85(1)(g) of the Wisconsin Statutes to confer with SWIB's chief legal counsel to receive advice concerning legal strategy for ongoing and potential litigation. The Board may convene in additional closed sessions or announce additional closed session items at the meeting in accordance with the procedure outlined in the Attorney General's Opinion reported at 66 OAG 106 (1977). Whenever a closed session is held, the Board will subsequently reconvene in open session to cover remaining agenda items.

Board Meeting

Tab 1 – Opening Remarks

Board Meeting

Tab 2 – Committee Reports – Open Session Items

A. Strategic Planning and Corporate Governance Committee
B. Compensation Committee
C. Benchmark and Performance Committee
D. Audit and Finance Committee

Board Meeting

Tab 3 – Consent Agenda

A. Open Session Minutes of December 14, 2022

B. Recommended Actions from Committee Agendas – Open Session Items

Regular Meeting of the Board of Trustees

Wednesday, March 28, 2023
STATE OF WISCONSIN INVESTMENT BOARD

CONSENT AGENDA – OPEN SESSION ITEMS

Proposed Motions:

1. Move to approve the Open Session Minutes of December 14, 2022, as presented.

2. Move to approve the amendments to the SWIB Corporate Governance Proxy Voting Guidelines, as recommended by the Strategic Planning and Corporate Governance Committee.

3. Move to approve the amendments to the Compensation and Workforce Development Committee Charter, as recommended by the Compensation and Workforce Development Committee.

4. Move to approve the amendments to the Compensation Philosophy, as recommended by the Compensation and Workforce Development Committee.

5. Move to approve the 2023 Strategic Results Scorecard, as recommended by the Compensation and Workforce Development Committee.

6. Move to approve changes to the Core Trust Fund public equity benchmark to adjust the public equity sub-asset class benchmark weights on a monthly basis to align with the actual weights of the MSCI ACWI Investable Market Index (IMI) beginning March 31, 2023, with the half-weight to China Large Cap equities, as recommended by the Benchmark and Performance Committee.

7. Move to approve the changes to the Audit and Finance Committee Charter, as recommended by the Audit and Finance Committee.

STATE OF WISCONSIN INVESTMENT BOARD
Board of Trustees Meeting – Open Session

Wednesday, December 14, 2022

Offices of the Investment Board
121 East Wilson Street, Madison, Wisconsin

Board Members Present:
Barb Nick, Chair
Clyde Tinnen, Vice Chair
Esther Ancel, Trustee
Kathy Blumenfeld, Trustee
Jeff DeAngelis, Trustee
Kristi Palmer, Trustee
Dave Schalow, Trustee
Dave Stein, Trustee
John Voelker, Trustee

Staff/Others Present:
Nathan Ballard, Senior Legal Counsel
Brandon Brickner, Internal Audit Director
Sara Chandler, Chief Legal Counsel
Edwin Denson, Executive Director/Chief Investment Officer
Heather Dobson, Finance Operations Manager
Anne-Marie Fink, Private Markets & Funds Alpha Chief Investment Officer
Greg Fletcher, Performance Director
Jameson Greenfield, Chief Financial Officer
Brian Heimsoth, Senior Portfolio Manager
Mike Jacobs, Agency Business Director
Rochelle Klaskin, Deputy Executive Director/Chief Administrative Officer
Leo Kropywiansky, Senior Portfolio Manager
Jay Risch, Government Relations Liaison
Dawn Tuescher, Executive Administrative Assistant
Chris Levell, NEPC
Joe Nankof, NEPC
Samuel Rebenstorf, Legislative Audit Bureau
Bob Schaefer, State Engineers Association & Wisconsin Coalition of Annuitants
George Mickelson, State Engineers Association
(Some individuals may have attended only portions of the meeting.)

Trustee Nick, Chair of the Board of Trustees, declared a quorum was present and called the Board of Trustees meeting to order at 9:00 a.m. on December 14, 2022.

1. <u>Committee Reports – Open Session Items</u>

A. Strategic Planning and Corporate Governance Committee

Trustee Nick, Chair of the Strategic Planning and Corporate Governance Committee, reported that in open session, after approving the prior meeting minutes, the Committee: **(1)** reviewed and approved changes to its Charter; and **(2)** heard a strategy report and market outlook from SWIB's beta one consultant. During closed session, the Committee received confidential updates regarding Project Centum and Board and staff consultant contracts. In executive closed session, the Committee met with Edwin Denson, Executive Director/Chief Investment Officer, for an update on his 2022 performance goals.

B. Benchmark and Performance Committee

Trustee Schalow, Chair of the Benchmark and Performance Committee, reported that in open session, after approving the prior meeting minutes, the Committee: **(1)** reviewed the Committee's Charter, Policies and Benchmarking Philosophy; **(2)** received a review of common performance and risk measures by staff; and **(3)** recommended that the Board approve benchmark changes proposed by its benchmark consultant.

C. Audit and Finance Committee

Trustee Palmer, Chair of the Audit and Finance Committee, reported that in open session, after approving the prior meeting minutes, the Committee: **(1)** approved the State Investment Fund Audited Financial Statements for Fiscal Year 2022; **(2)** approved draft audit reports for IT Governance and Private Equity and Current Return Co-Investments, as well as an External Audit Summary; **(3)** approved the proposed 2023 Internal Audit Plan; and **(4)** recommended that the Board approve the Total Cost of Management Plan for calendar year 2023. The Committee also reviewed open audit issues, the five-year forecast, the Quarterly Cost of Management Update for Q3 2022, and the 2022 Internal Audit Plan. In closed session, the Committee approved prior meeting minutes and met with the Internal Audit Director in executive closed session.

D. Compensation and Workforce Development Committee

Trustee Stein, Chair of the Compensation and Workforce Development Committee, reported that in open session, after approving the prior meeting minutes, the Committee recommended approval of: **(1)** amendments to the SWIB Compensation Philosophy; **(2)** the revised Incentive Compensation Plan — Unclassified Investment Management Staff; and **(3)** Relative Performance Maximums, as recommended by the Board's RPM consultant. The Committee also received a recruiting and people metrics update, reviewed incentive compensation projections for CY2022, and discussed incentive compensation deferral options. In executive closed session, the Committee reviewed succession planning with ED/CIO, Edwin Denson.

2. Consent Agenda

Sara Chandler, Chief Legal Counsel, distributed a proposed consent agenda. Trustee Nick asked whether there were any motions listed on the consent agenda that should be removed for further discussion and individual action. Hearing none, she referred to the following items on the consent agenda:

- Move to approve the Open Session Minutes, Closed Session Minutes, and Executive Closed Session Minutes of September 14, October 18-19, and November 14, 2022, in each case, as presented.
- Move to: (i) approve the benchmark changes, as recommended by SWIB's benchmark consultant, Verus Advisory, and SWIB's Investment Committee; (ii) approve the effective date of October 1, 2022 for the international small cap equities provisional benchmark that was approved by SWIB's Investment Committee in September 2022; (iii) approve an effective date on or after January 1, 2023, in connection with corresponding asset allocation changes, for all other recommended

benchmarks; and (iv) approve that all other benchmarks remain unchanged, each as recommended by the Benchmark and Performance Committee.

- Move to approve the Total Cost of Management Plan for Calendar Year 2023, as recommended by the Audit and Finance Committee.
- Move to approve the amended Compensation Philosophy, as amended and recommended by the Compensation and Workforce Development Committee.
- Move to approve the amended Incentive Compensation Plan — Unclassified Investment Management Staff, as recommended by the Compensation and Workforce Development Committee.
- Move to approve the Relative Performance Maximums effective beginning in 2023, as recommended by Verus Advisory and the Compensation and Workforce Development Committee.

Motion: A motion was made by Trustee Palmer and seconded by Trustee Tinnen to approve the consent agenda, as presented. The motion passed unanimously.

3. Investment Performance and Market Updates

A. Board Investment Performance Report, Q3 2022

Greg Fletcher, Performance Director, presented the *Investment Performance Report*, as of September 30, 2022, included on pages 25-40 of the meeting materials. Mr. Fletcher reported that **(1)** the Core Trust Fund (CTF) returned -5.04% net of fees in Q3 2022, resulting in excess performance of 10 basis points (bps) for the quarter, **(2)** the CTF returned -13.35% net of fees for the one-year period, resulting in an excess return of 25 bps, **(3)** the CTF five-year net-of-fee return of 5.85% outperformed the Policy Benchmark by 50 bps on an annualized basis, and **(4)** the CTF gross return outperformed the 60/40 Reference Portfolio return by 101.7% (cumulative) over the past 20 years, which equates to $32.6 billion over the same period.

Mr. Fletcher highlighted that the CTF net-of-fee return outperformed its benchmark for the one-, three-, five-, ten-, and twenty-year time periods, and the CTF gross-of-fee return outperformed its benchmark for the thirty-year time period. The Variable Trust Fund (VTF) had excess returns over its benchmark for the one-, ten-, and twenty-year periods net of fees. Mr. Fletcher then noted that SWIB's investment management has added more than $2.3 billion above benchmark returns to the WRS over the last five years.

Mr. Fletcher then referenced that the percentage of WRS assets that were internally managed had declined to 39% due predominantly to the impact of the denominator effect and that the percentage of actively managed assets continued to increase. Next, Mr. Fletcher: **(1)** provided a breakdown of CTF asset class exposures, noting that the portfolio remains well diversified and the private markets asset classes (Private Equity/Debt and Real Estate) remain elevated due to the denominator effect; **(2)** reviewed the asset class performance for the CTF over various time periods; **(3)** reviewed VTF performance and asset class exposures, noting asset class exposures were within target range; and **(4)** noted that all Separately Managed Funds had positive relative performance over the medium- and long-term, with four under-performing over the year-to-date and one-year time periods, including one for which SWIB does not determine the allocation strategy.

Mr. Fletcher concluded by reviewing the *Leverage Performance,* included on page 42 of the meeting materials. He noted that policy leverage contributed 236 bps of loss to CTF absolute performance year-to-date, as expected in a negative return environment, but remained a positive contributor over the 3- and 5-year periods.

B. Callan Quarterly Report

Mr. Fletcher noted that the *Callan Quarterly Report Summary* as of September 30, 2022 was included on pages 43-47 of the meeting materials. He highlighted that SWIB's total fund unadjusted rankings are near the median of peer returns over the three-, five-, and ten-year periods and in the fourth quartile for the one-year period. Mr. Denson called attention to the ten-year return consistency, noting that SWIB's disciplined approach to risk and asset allocation versus the policy target and peers generated meaningful outperformance following Q1 2020, but that peers have seen a rebound in performance during 2022.

4. Annual Presentation on Cost Benchmarking

Jameson Greenfield, Chief Financial Officer, presented *SWIB's Cost Effectiveness Annual Evaluation*, included on pages 57-65 in the meeting materials. Mr. Greenfield reported that, based on data collected and analyzed by CEM, the Board's independent cost consultant, SWIB's 2022 total costs were $91 million (7.0 bps) lower than the U.S. public fund average, but $29 million (2.2 bps) higher than the hypothetical CEM benchmark cost, a difference attributable to the cost of SWIB's relatively higher share of active investing. When compared to a peer subset of 15 U.S. public funds, SWIB's costs exceeded the peer median by 2.6 bps, but this is predominantly due to hedge fund performance fees, which must be considered in the context of the total return generated from the asset class (*i.e.*, higher hedge fund performance fees are largely a function of superior hedge fund returns). When excluding the impact of the hedge fund performance fees, SWIB's costs were below the peer median by 4.2 bps. Mr. Greenfield highlighted that SWIB manages more assets in house than its peers, and the cost for internal active management is lower than the cost for active external management. Mr. Greenfield also noted that SWIB saved $903 million versus peers from 2012 to 2021.

5. Asset Allocation Recommendation

Chris Levell, Partner, NEPC, and Joe Nankof, Principal, NEPC, presented the *Asset Allocation Recommendations*, included on pages 67-105 of the meeting materials, noting that the materials did not include any substantive changes from the draft recommendations presented to the Board in October.

Mr. Levell then reviewed NEPC's asset allocation recommendations for the CTF to: **(a)** increase the target allocations to Private Equity/Debt from 12% to 15% and Real Estate from 7% to 8%; **(b)** effect a corresponding 4% decrease in the Public Equity allocation; **(c)** expand the ranges around the Private Equity/Debt and Real Estate allocations to account for growth and liquidity factors; and **(d)** adjust the Public Equity sub-asset class allocations to reflect current MSCI index weights (with a China half-weight) while maintaining the Public Fixed Income sub-asset class allocations. No changes were recommended for the VTF.

Mr. Nankof reviewed the background and context behind these recommendations, much of which had previously been discussed during the October Board Workshop. He described the benefits of private markets exposure, including higher returns and lower volatility, as well as constraints posed by the illiquidity of the asset class. He reviewed the results of both cash flow and asset projections, highlighting that liquidity is currently ample given the size and composition of the CTF. He then shared **(a)** five-year forward-looking scenario analysis of private markets exposure comparing five potential economic environments, **(b)** historical data examining the impact on private markets exposure from the past year and the Great Financial Crisis, and **(c)** stochastic simulations aimed at identifying the 5% and 95% confidence level for a distribution of Private Equity/Debt and Real Estate exposure using the recommended 2023 targets, and answered questions. In light of the private markets changes, Mr. Nankof suggested that NEPC focus on liquidity as a standard portion of the asset allocation analysis in "off" years when not working with the WRS actuaries.

Mr. Denson then referenced the Asset Allocation Overview and Recommendations for 2023, included on pages 106-110 in the materials. Mr. Denson highlighted for the Board that, since the 2022 asset allocation, the public equity asset class has been intended to track the components of the MSCI ACWI Investable Market Index (IMI) with a half-weight to China Large Cap equities. However, the 2022 asset allocation fixed the sub-asset class weights at September 30, 2021 values. For 2023, staff would like to improve the rebalancing process by modifying the sub-asset class weights on a monthly or quarterly basis to reflect the actual values. As a first step, the motion today will specify the use of March 31, 2023 weights, and staff will come back to the Board with a recommendation for how to implement the sub-asset class modifications for the remainder of 2023 and beyond.

Motion: A motion was made by Trustee Voelker and seconded by Trustee DeAngelis to adopt and approve the asset allocation and active risk targets for the Core Trust Fund and the Variable Trust Fund as set forth and further described in the Asset Allocation Overview and Recommendations for 2023 included in the Board materials, as recommended by the Investment Committee and the Board's asset allocation consultant, NEPC; provided that for purposes of the public equity sub-asset class target allocations, the 2023 asset allocation will reflect the actual weights of the components of the MSCI ACWI Investable Market Index (IMI) as of March 31, 2023, with the half-weight to China Large Cap equities.

6. Investment Committee Open Session Business

A. Amendments to WRS Investment Committee Investment Guidelines

Ms. Chandler discussed amendments to the *SWIB Investment Committee Wisconsin Retirement System Investment Guidelines,* approved by the Investment Committee on September 27, 2022 and included on pages 112-159 of the meeting materials. She noted the inclusion of SWIB's existing relative drawdown monitoring and reporting procedures into the guidelines, the modification of certain public fixed income duration measures for consistency across portfolios, a new tracking error soft risk parameter for the global utilities index equity portfolios, and guidelines for the new active long treasury portfolio.

C. Approved Open Session Investment Committee Minutes

Ms. Chandler stated that the approved open session minutes of the August 23, September 27 and October 25, 2022 Investment Committee meetings were included on pages 160-178 of the meeting materials for the Board's review and noted that staff had previously reviewed the agendas for these meetings with the Board.

D. Agendas for Upcoming Meetings

Ms. Chandler also stated that the final open session agenda for the November 22, 2022 Investment Committee meeting and the draft open session agendas for the December 15, 2022 and January 24, 2023 meetings were included on pages 179-184 of the meeting materials for the Board's review.

7. <u>Quarterly Investment Update, Q3 2022</u>

Mr. Denson presented the *Performance Trends & Outlook,* included on pages 188-190 of the meeting materials. Mr. Denson began by noting that the CTF five-year rolling return trend has come down from previous levels, slightly below the actuarial target rate of return as of September 30, 2022. He then provided a brief commentary on the CTF five-year return estimate, which projected a five-year annualized return of 10.4% using NEPC assumptions for 2022, but which is reduced to 5.7% when using preliminary realized year-to-date returns through the end of October. Noting that every asset class benchmark has experienced losses this year, Mr. Denson commented that the five-year estimate is impacted by two key components, the losses across the market in 2022, but also the fact that a positive 15.8% return for 2017 is no longer included in the five-year calculation.

Leo Kropywiansky, Senior Portfolio Manager – Asset & Risk Allocation, presented the *Economic Update*, included on pages 191-224 of the meeting materials. Mr. Kropywiansky argued that inflation has likely peaked but remains well above the Federal Reserve's 2.0% target. He noted that bringing high inflation down will require central bank tightening and a likely recession, but that it may take a while for the recession to develop given that the average consumer remains in a relatively stable position. SWIB's outlook is for moderating inflation, but at a slower pace than many investors project. SWIB expects negative growth in 2023. Mr. Kropywiansky reviewed several key indicators in more detail, including personal consumption expenditures (PCE), supply chain pressures, goods inflation, and rent inflation. He noted that supply chain pressures and goods price inflation have eased somewhat, but that persistent undersupply of housing is driving rent inflation, which is expected to remain high in the next two years. In addition, the liquidity cushion experienced by many households throughout 2022, due to government stimulus and forced savings during the COVID-19 pandemic, is starting to reverse and will likely start to impact labor force participation. The market is currently projecting a Fed Funds rate of 5.0%, followed by cutting, but the Fed has signaled that is unrealistic.

Mr. Kropywiansky continued with a close review of the labor market, noting that the labor market is still showing high wage inflation and the quit rate remains high. While the quit rate has begun falling and labor force participation is up from its pandemic lows, it has not yet recovered to pre-pandemic levels, and certain sectors of the labor market, including men and women over 55, have recovered slower than others. He also reviewed the housing market, stating that recent market overvaluation, driven by easy monetary policy, low rates, and a boost in second home buying, is starting to reverse and the U.S. is likely to enter a period of outright decline in house prices. While a correction is coming, it is unlikely to be as severe as the post-GFC period because household balance sheets are generally in much better shape and debt service ratios are much lower.

8. <u>Motion to Convene in Closed Session</u>

<u>Motion</u>: A motion to convene in closed session pursuant to Sections 19.36(5) and 19.85(1)(e) of the Wisconsin Statutes to (a) consider confidential and proprietary strategies for the investment of public funds relating to specific proprietary investment strategies of internal WRS portfolios, asset allocation, and risk management, and (b) approve prior closed session minutes that discuss the same was made by Trustee Nick and seconded by Trustee Palmer.

The Chair called for a roll call vote.

Ancel–Aye	Blumenfeld–Aye	DeAngelis–Aye	Nick-Aye	Palmer-Aye
Schalow-Aye	Stein–Aye	Tinnen-Aye	Voelker-Aye	

There being nine ayes and no nays, the Chair declared the motion passed. The Board convened in closed session at 11:22 a.m. and reconvened in open session at 12:10 p.m.

9. Announcement of Board Actions Relating to Items Taken up in Closed Session

Trustee Nick announced that while in closed session the Board: **(1)** received a closed-session quarterly investment update; **(2)** discussed implementation of the 2023 asset allocation; **(3)** heard a review of expected tail loss analysis; **(4)** received a risk management update; and **(5)** discussed Investment Committee closed session business.

10. Reports Filed Without Comment

In the absence of questions, the following reports, included on pages 307-319 of the meeting materials, were filed without comment: Quarterly Charges to Funds Report, Q3 2022; and Private Markets and Funds Alpha Commitments, Q3 2022.

11. Future Items for Discussion

Ms. Chandler noted that the Annual Agenda Plan was included on pages 321-324 in the meeting materials for the Board's information

12. Adjourn

Motion: A motion to adjourn was made by Trustee Voelker and seconded by Trustee Stein. The motion passed unanimously, and the meeting was adjourned at 12:11 p.m.

Date of Board Approval: ______________________________

Signed: ____
Barb Nick, Board Secretary

Board Meeting

Tab 4 – Election of Secretary and Assistant Secretary

Board Meeting

Tab 5 – Annual Committee Assignments by Board Chair

Pursuant to the Board Procedures, a Secretary and an Assistant Secretary are elected each year. The Governor appoints the Board Chair and Vice Chair.

Clyde Tinnen, Vice Chair and Secretary
Sara Chandler, Assistant Secretary

Pursuant to each Committee Charter, the Board Chair shall appoint members of each Committee and appoint members to serve as Committee chair, vice chair and secretary for terms not to exceed one year. These appointments shall be in effect until April 30, 2023.

Audit and Finance Committee

Kristi Palmer, Chair
John Voelker, Vice Chair & Secretary
Clyde Tinnen
David Stein
State Controller, ex-officio
State Auditor, ex-officio

Benchmark and Performance Committee

Dave Schalow, Chair
Kristi Palmer, Vice Chair & Secretary
Esther Ancel
Jeff DeAngelis

Compensation Committee

David Stein, Chair
Jeff DeAngelis, Vice Chair & Secretary
Barb Nick
Dave Schalow

Strategic Planning and Corporate Governance Committee

Clyde Tinnen, Chair
Esther Ancel, Vice Chair & Secretary
Kathy Blumenfeld
Barb Nick
John Voelker

*If a member has not been appointed, the Board Chair reserves the right to appoint additional Committee members on a temporary or permanent basis.

Pursuant to the Board Procedures, a Secretary and an Assistant Secretary are elected each year. The Governor appoints the Board Chair and Vice Chair.

Clyde Tinnen, Vice Chair and Secretary
Sara Chandler, Assistant Secretary

Pursuant to each Committee Charter, the Board Chair shall appoint members of each Committee and appoint members to serve as Committee chair, vice chair and secretary for terms not to exceed one year. These appointments shall be in effect from May 1, 2023 until February 28, 2024.

Audit and Finance Committee

Kristi Palmer, Chair
John Voelker, Vice Chair & Secretary
Clyde Tinnen
[Vacant]

State Controller, ex-officio
State Auditor, ex-officio

Benchmark and Performance Committee

Dave Schalow, Chair
Kristi Palmer, Vice Chair & Secretary
Esther Ancel
Jeff DeAngelis

Compensation Committee

Jeff DeAngelis, Chair
Barb Nick, Vice Chair & Secretary
Dave Schalow
[Vacant]

Strategic Planning and Corporate Governance Committee

Clyde Tinnen, Chair
Esther Ancel, Vice Chair & Secretary
Kathy Blumenfeld
Barb Nick
John Voelker

Board Meeting

Tab 6 – Proposed 2024 Board Meeting Dates

STATE OF WISCONSIN INVESTMENT BOARD
2024 Proposed Board Meeting Dates

Tuesday/Wednesday	**March**	**19/20**
Tuesday/Wednesday	**June**	**11/12**
Tuesday/Wednesday	**September**	**10/11**
Tuesday/Wednesday (off-site)	**October**	**15/16**
Thursday/Friday	**December**	**10/11**

MEETING SITE:

Offices of the State of Wisconsin Investment Board
4703 Madison Yards Way, Madison, WI 53705
Conference Room – 1st Floor

*Board meetings are held the second Tuesday/Wednesday of the month in June, September & December and the third Tuesday/Wednesday in March & October.

Board Meeting

Tab 7 – Investment Performance and Market Updates

Investment Performance Report

as of December 31, 2022

STATE OF WISCONSIN
INVESTMENT BOARD

Executive Summary

December 31, 2022

- The Core Trust Fund returned 5.75% net of fees in Q4, resulting in excess performance of +30 bps in Q4. For one year, the Core Trust Fund has returned (12.83%) net of fees, resulting in an excess return of +46 bps.

- The Core Trust Fund five-year net of fee return of 6.25% outperforms the Policy Benchmark by +57 bps on an annualized basis.

- The Core Trust Fund gross return outperformed the 60/40 Reference Portfolio return by 100.4% (cumulative) over a 20-year period, which equates to $34.3 billion over the same period.

SWIB
STATE OF WISCONSIN INVESTMENT BOARD

WRS Performance

as of December 31, 2022

Fund	Net of All Fee and Expense Return % Calendar – YTD	1 Year	3 Year	5 Year
Core Trust Fund	(12.92)	(12.92)	5.46	6.16
Core Trust Fund Benchmark	(13.29)	(13.29)	4.79	5.68
Excess	**+0.37**	**+0.37**	**+0.67**	**+0.47**
Net Excess Value Add ($M)	**+$538.8**	**+$538.8**	**+$2,402.4**	**+$2,752.9**
Variable Trust Fund	(17.83)	(17.83)	5.02	6.48
Variable Trust Fund Benchmark	(18.06)	(18.06)	5.11	6.55
Excess	**+0.23**	**+0. 23**	**(0.10)**	**(0.06)**
Net Excess Value Add ($M)	**+$27.0**	**+$27.0**	**($20.9)**	**(19.0)**

(Annualized Return shown for all periods greater than 1 yr)

SWIB's investment management has added more than $2.7 billion above benchmark returns over the last five years to the WRS.

Fund	Net of Fee and Expense Return % 5 Year	10 Year	20 Year	Gross of Fee Return % 30 Year
Core Trust Fund	6.25	7.25	7.68	8.07
Core Trust Fund Benchmark	5.68	6.84	7.38	7.59
Excess	**+0.57**	**+0.41**	**+0.30**	**+0.47**
Variable Trust Fund	6.54	9.82	8.83	8.59
Variable Trust Fund Benchmark	6.55	9.75	8.80	8.30
Excess	**(0.00)**	**+0.07**	**+0.02**	**+0.29**

(Annualized Return shown for all periods greater than 1 yr)

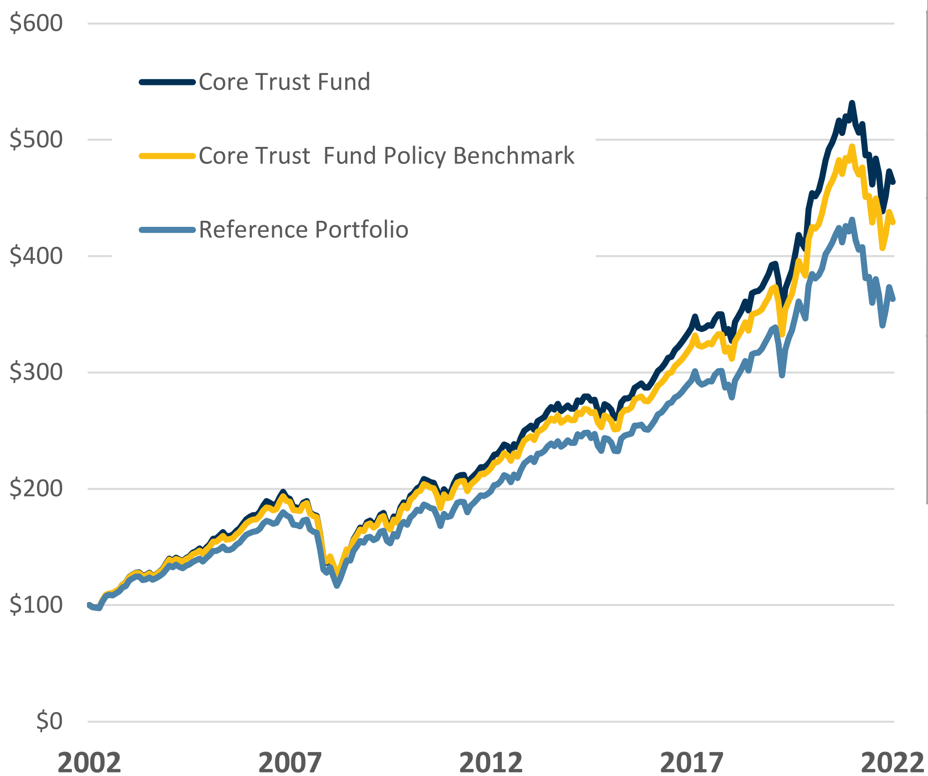
Excess returns may contain rounding differences

SWIB
STATE OF WISCONSIN INVESTMENT BOARD

CTF Performance vs. 60/40 Reference Portfolio

20-year cumulative return[1]: January 1, 2003, to December 31, 2022

Indexed Benefit of CTF's Asset Allocation & Active Management Over Time



Portfolio / Benchmark	Annualized Gross Return	Cumulative Gross Return	Cumulative $ Value Added
Reference Portfolio[2] (60% equity/40% bonds)	**6.7%**	**263.2%**	**= Passive Market Return**
Benefit of CTF Asset Allocation			
CTF Policy Benchmark	**7.6%**	**329.1%**	**+$22.9B**
Benefit of CTF Active Management			
CTF Actual Results	**8.0%**	**363.6%**	**+$11.4B**
CTF Excess Return vs. Reference Portfolio	**+1.3% pts**	**+100.4% pts**	**+$34.3B**

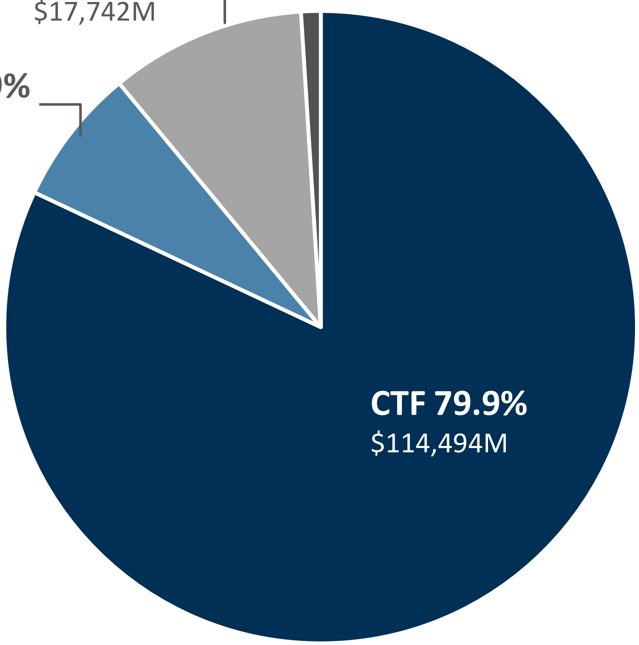
[1] Core Trust Fund beginning market value, as of January 1, 2003, was $46.3B and ending market value, as of December 31, 2022, was $114.5B

[2] Reference Portfolio is composed of 60% MSCI World and 40% Bloomberg US Gov't / Credit (rebalanced monthly)

SWIB STATE OF WISCONSIN INVESTMENT BOARD

Total Assets Under Management (AUM)

as of December 31, 2022



Gross Market Value of Assets ($millions)			
By Fund	**12/31/2021**	**12/31/2022**	**1 Year Change**
Total WRS	147,239	122,933	(24,306)
Core Trust Fund	136,312	114,494	(21,818)
Variable Trust Fund	10,927	8,439	(2,488)
State Investment Fund (SIF) [1]	16,051	17,742	+1,691
Separately Managed Funds	2,399	2,618	+219
Total SWIB AUM	**$165,689**	**$143,293**	**($22,396)**

[1] *Excludes cash invested in SIF held on behalf of CTF and VTF*

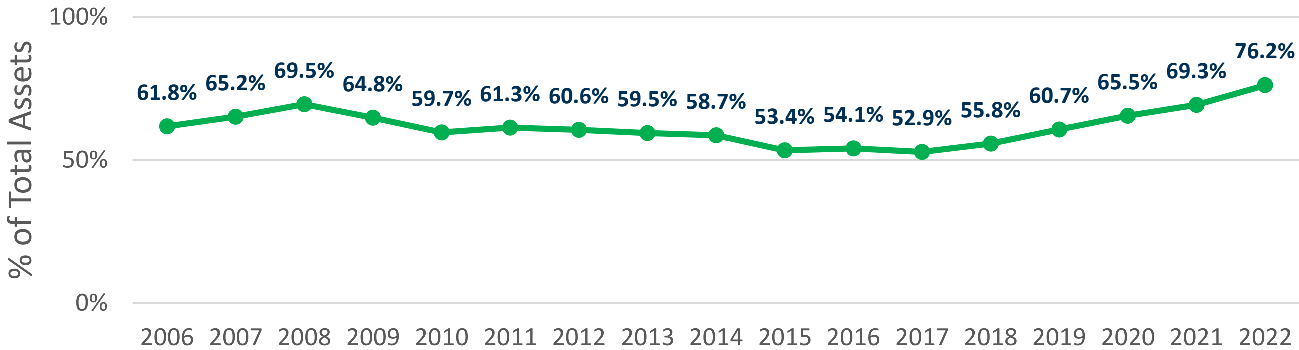
Refer to the disclosure section for additional details

SWIB
STATE OF WISCONSIN INVESTMENT BOARD

WRS Assets as of December 31, 2022

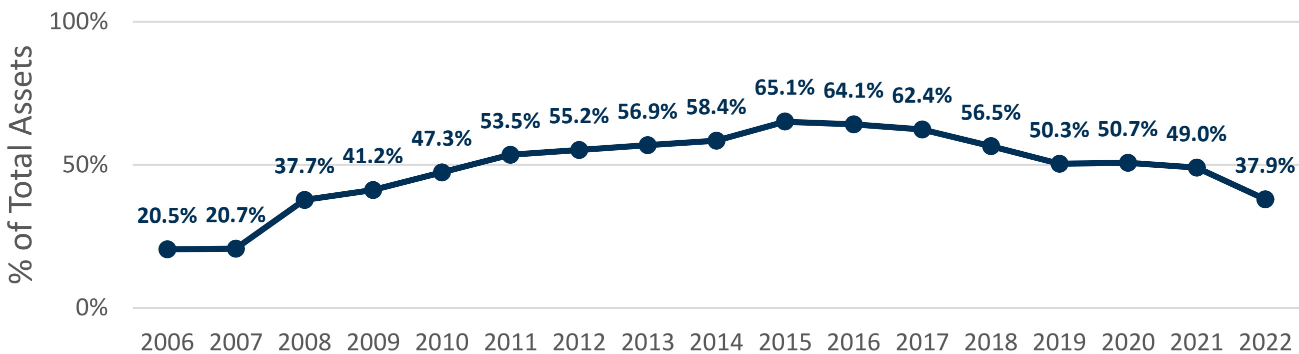
Breakdown of Active vs. Passive and Internal vs. External

Actively Managed Assets



Actively managed assets are a larger share of WRS AUM

Internally Managed Assets



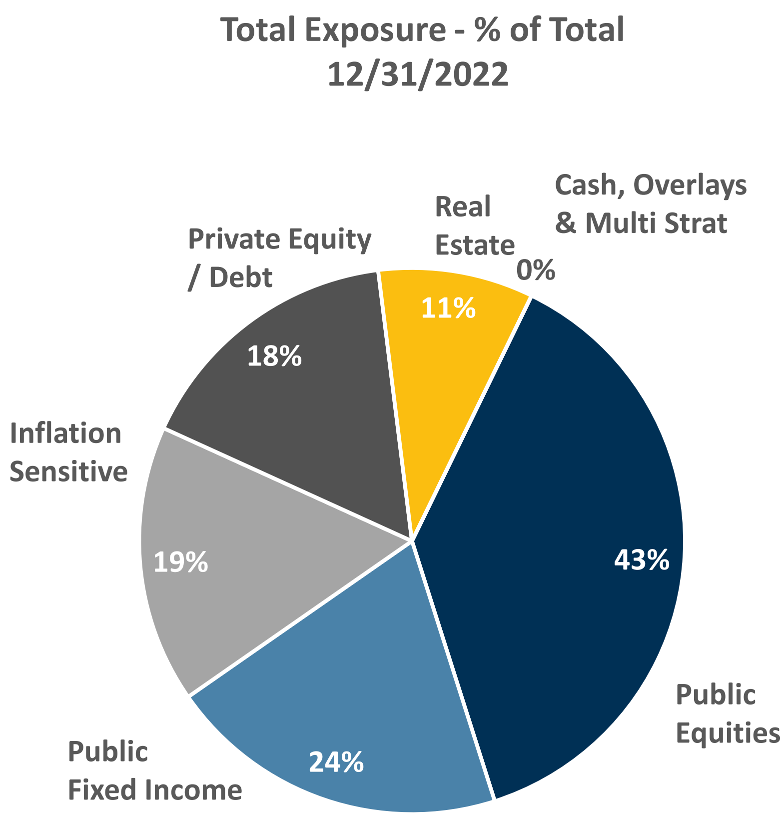
45% of Total SWIB Assets (including SIF) are internally managed

Refer to the disclosure section for additional details

SWIB STATE OF WISCONSIN INVESTMENT BOARD

Core Trust Fund Assets Under Management

Breakdown by Asset Class as of December 31, 2022



Total CTF by Asset Class	Total Exposure $ 12/31/2021	Total Exposure $ 12/31/2022	Year over Year Change
Total Exposure $ & Adjusted AUM ($millions)			
Public Equities	67,380	49,623	(17,757)
Public Fixed Income	32,096	27,155	(4,941)
Inflation Sensitive	21,078	21,641	+563
Real Estate	9,548	12,003	+2,455
Private Equity / Debt	18,380	20,843	+2,463
Multi Asset	4,619	1	(4,618)
Cash & Overlays	(190)	303	+493
Total Exposure	**$152,910**	**$131,570**	**(21,340)**
Less: Policy Leverage	*16,599*	*17,077*	*+478*
Total CTF AUM	**$136,312**	**$114,494**	**(21,818)**

Total Exposure is composed of the gross market value of investments, plus beta exposure added or offset through derivative instruments

SWIB
STATE OF WISCONSIN INVESTMENT BOARD

Core Trust Fund Allocation

All exposures shown as of December 31, 2022

Allocation – Exposure View

Strategies	($ millions) Total Exposure	As % of Total Fund Portfolio Exposure %	Benchmark Target %	Target Range %
Public Equities	**49,623**	**43.34**	**43.55**	**37.55 – 49.55**
Global Developed	38,801	33.89	34.02	
US Small Cap	3,322	2.90	2.92	
International Small Cap	2,966	2.59	2.61	
Emerging Markets	4,533	3.96	4.01	
Public Fixed Income	**27,155**	**23.72**	**23.76**	**17.76 – 29.76**
Investment Grade	16,329	14.26	14.25	
Non-Investment Grade	8,069	7.05	7.13	
Emerging Market Debt	2,758	2.41	2.38	
Inflation Sensitive	**21,641**	**18.90**	**19.00**	**14.0 – 24.0**
Real Estate	**12,003**	**10.48**	**10.48**	**actual exposure***
Private Equity / Debt	**20,843**	**18.20**	**18.20**	**actual exposure***
Multi Asset	**1**	**0.00**	**0.00**	**0.0**
Cash / Overlays	**303**	**0.26**	**0.00**	
Leverage	**(17,077)**	**(14.91)**	**(15.00)**	**(20.0) to (10.0)**
Total Fund – Total Exposure	**$131,570**	**114.91**	**115.00**	**110.0 – 120.0**
Total Fund – Market Value	**$114,494**	**100.00**	**100.00**	

Notes

Public & Private exposures include cash

Strategies include exposure management investments

Cash / Overlays:
Includes liquidity, overlay cash, cash used to fund synthetic beta related to Alpha Pool.

Benchmark Target weights are adjusted monthly to reflect the actual exposure to Private Equity/Debt and Real Estate. Offsetting adjustments are made to Public Equities and Public Fixed Income.

* Target ranges reflect Board-approved corridor treatment

Additional CTF leverage details available in disclosure section

Asset $ exposures and % weights may contain rounding differences

SWIB
STATE OF WISCONSIN INVESTMENT BOARD

Core Trust Fund: Asset Class Returns

as of December 31, 2022

Asset Class Group: Public Equities	Performance Start Date	Total Exposure Value ($millions)	Net of External Manager Fee Return %				
			Calendar YTD	1 Year	3 Year	5 Year	10 Year or ITD
Public Equities	**12/31/2002**	$49,584	(17.81)	(17.81)	4.41	5.72	8.52
Benchmark			(18.04)	(18.04)	4.74	5.95	8.63
Excess			**+0.23**	**+0.23**	**(0.33)**	**(0.23)**	**(0.11)**
Global Developed	**2/28/2017**	$38,105	(17.41)	(17.41)	4.94	6.35	8.25
Benchmark			(17.75)	(17.75)	5.43	6.66	8.54
Excess			**+0.34**	**+0.34**	**(0.48)**	**(0.31)**	**(0.29)**
US Small Cap	**2/28/2017**	$3,322	(19.33)	(19.33)	4.24	5.53	6.74
Benchmark			(18.59)	(18.59)	3.89	4.61	5.98
Excess			**(0.74)**	**(0.74)**	**+0.35**	**+0.92**	**+0.76**
International Small Cap	**1/31/2020**	$2,960	(22.31)	(22.31)			0.02
Benchmark			(21.58)	(21.58)			0.16
Excess			**(0.73)**	**(0.73)**			**(0.14)**
Emerging Market ex China	**3/31/2022**	$3,481					(17.17)
Benchmark							(16.26)
Excess							**(0.91)**
Emerging Market China	**3/31/2022**	$899					(10.94)
Benchmark							(9.08)
Excess							**(1.87)**

(periods greater than 1 yr show annualized return, since inception returns shown for strategies with less than 10-year history)

Excess returns may contain rounding differences
Refer to the disclosure section for additional details

SWIB
STATE OF WISCONSIN INVESTMENT BOARD

Core Trust Fund: Asset Class Returns

as of December 31, 2022

Asset Class Group: Public Fixed Income & Inflation Sensitive	Performance Start Date	Total Exposure Value ($millions)	Net of External Manager Fee Return %				
			Calendar YTD	1 Year	3 Year	5 Year	10 Year or ITD
Public Fixed Income	**12/31/2003**	$27,147	(13.86)	(13.86)	(2.30)	0.43	1.29
Benchmark			(12.69)	(12.69)	(2.24)	0.41	1.19
Excess			**(1.17)**	**(1.17)**	**(0.06)**	**+0.02**	**+0.10**
Investment Grade US Credit	**2/28/2022**	$6,218					(11.47)
Benchmark							(10.76)
Excess							**(0.70)**
US Treasuries	**2/28/2022**	$6,604					(10.43)
Benchmark							(10.18)
Excess							**(0.25)**
US Long Treasuries	**9/30/2022**	$1,087					(0.49)
Benchmark							(0.59)
Excess							**+0.10**
MBS	**4/30/2020**	$2,152	(13.56)	(13.56)			(5.21)
Benchmark			(11.81)	(11.81)			(4.84)
Excess			**(1.75)**	**(1.75)**			**(0.37)**
High Yield	**7/31/2019**	$5,369	(16.70)	(16.70)	(0.91)		0.10
Benchmark			(10.55)	(10.55)	(0.11)		0.96
Excess			**(6.14)**	**(6.14)**	**(0.79)**		**(0.87)**

(periods greater than 1 yr show annualized return, since inception returns shown for strategies with less than 10-year history)

Excess returns may contain rounding differences
Refer to the disclosure section for additional details

SWIB
STATE OF WISCONSIN INVESTMENT BOARD

Core Trust Fund: Asset Class Returns

as of December 31, 2022

Asset Class Group: Public Fixed Income & Inflation Sensitive	Performance Start Date	Total Exposure Value ($millions)	Net of External Manager Fee Return %				
			Calendar YTD	1 Year	3 Year	5 Year	10 Year or ITD
Emerging Market Debt - USD	**6/30/2005**	$1,376	(16.56)	(16.56)	(4.70)	(0.98)	1.67
Benchmark			(17.78)	(17.78)	(5.28)	(1.31)	1.59
Excess			**+1.23**	**+1.23**	**+0.58**	**+0.33**	**+0.08**
Emerging Market Debt - Local	**7/31/2017**	$1,375	(10.98)	(10.98)	(6.03)	(3.01)	(2.27)
Benchmark			(11.69)	(11.69)	(6.11)	(2.51)	(1.91)
Excess			**+0.70**	**+0.70**	**+0.08**	**(0.50)**	**(0.36)**
Inflation Sensitive	**12/31/2003**	$21,636	(11.78)	(11.78)	1.36	2.33	0.71
Benchmark			(11.85)	(11.85)	1.21	2.20	0.64
Excess			**+0.07**	**+0.07**	**+0.15**	**+0.13**	**+0.07**

(periods greater than 1 yr show annualized return, since inception returns shown for strategies with less than 10-year history)

Excess returns may contain rounding differences
Refer to the disclosure section for additional details

SWIB
STATE OF WISCONSIN INVESTMENT BOARD

Core Trust Fund: Asset Class Returns

as of December 31, 2022

Asset Class Group: Private Markets & Other Strategies	Performance Start Date	Total Exposure Value ($millions)	Net of External Manager Fee Return %				
			Calendar YTD	1 Year	3 Year	5 Year	10 Year or ITD
Real Estate	**12/31/2003**	$12,003	16.77	16.77	11.08	9.41	10.96
Benchmark			20.96	20.96	11.38	9.26	9.80
Excess			**(4.19)**	**(4.19)**	**(0.30)**	**+0.15**	**+1.16**
Private Equity / Debt	**11/30/2006**	$20,843	3.87	3.87	20.51	17.42	15.12
Benchmark			0.44	0.44	16.73	13.98	12.54
Excess			**+3.43**	**+3.43**	**+3.78**	**+3.45**	**+2.58**
Other strategies:							
Alpha Pool Overlay	**1/31/2011**	$10,589	3.11	3.11	6.01	3.80	3.13
Benchmark (set to zero as of 1/1/2019)		(at 1/1/22 = $6,336)	0.00	0.00	0.00	0.52	1.35
Excess			**+3.11**	**+3.11**	**+6.01**	**+3.28**	**+1.78**
Emerging Market Equity	**2/28/2017**	$69	(21.82)	(21.82)	(2.91)	(1.99)	2.22
Benchmark		(at 1/1/22 = $4,039)	(20.05)	(20.05)	(2.65)	(1.34)	2.90
Excess			**(1.77)**	**(1.77)**	**(0.26)**	**(0.65)**	**(0.68)**

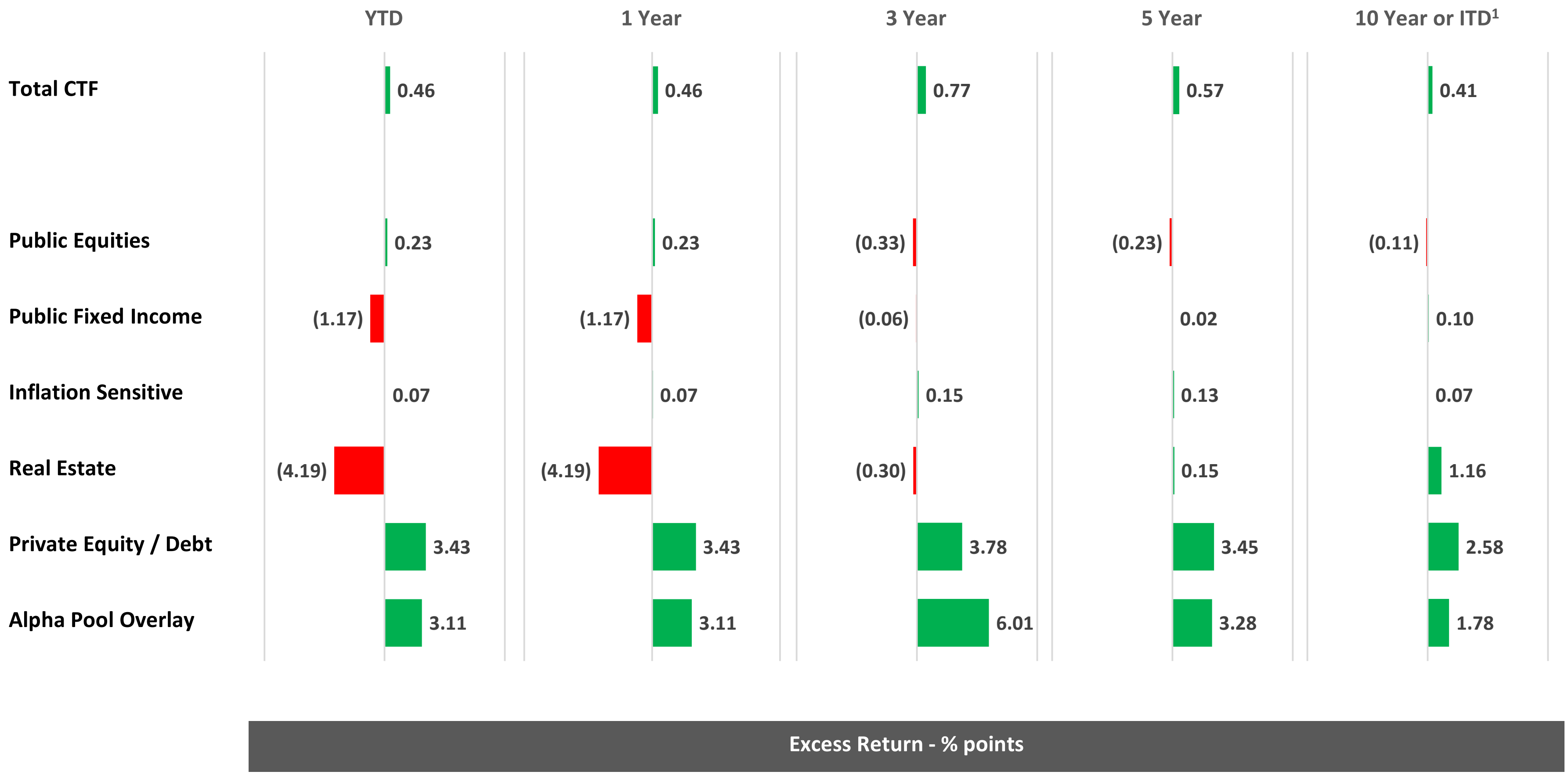
(periods greater than 1 yr show annualized return, since inception returns shown for strategies with less than 10-year history)

Excess returns may contain rounding differences
Refer to the disclosure section for additional details

SWIB
STATE OF WISCONSIN INVESTMENT BOARD

Core Trust Fund: Asset Class Returns

Net of External Mgr Fee - Excess Returns as of December 31, 2022



[1] Either 10-year annualized return or Since Inception (ITD) annualized return is used if there is insufficient return history

Excess returns may contain rounding differences
Refer to the disclosure section for additional details

Core Trust Fund: Alpha Pool Overlay

as of December 31, 2022

Alpha Pool Return	Performance Start Date	Market Value ($ millions)	Net of External Manager Fee Return %				
			Calendar YTD	1 Year	3 Year	5 Year	10 Year
Total Alpha Pool Composite	**1/31/2011**	**$10,589**	**3.11**	**3.11**	**6.01**	**3.80**	**3.13**

- Prior to the inclusion of Global Macro and Multi Strat sub strategies to the Pool in 1Q 2022, Hedge Fund sub strategy assets composed > 90% of the Alpha Pool Composite
- Each sub strategy in the composite incurs the cost of implementation expense (assessed on a pro rata basis using AUM).

Alpha Pool: Key Sub Strategies	Inclusion Date	Market Value ($ millions)	Calendar YTD or Since Inclusion Net Return %
Hedge Funds	1/31/2011	$7,782 (73%)	3.40
Global Macro	3/1/2022	$3 (0%)*	-8.06
Multi Strat	2/1/2022	$2,339 (22%)	4.01

**Global Macro Performance End Date: 11/7/2022*

Alpha Pool Overlay Return (Alpha Pool + Beta Return)	Calendar YTD	1 Year	3 Year	5 Year	10 Year
CTF Policy Benchmark (Beta)	**(13.29)**	**(13.29)**	**4.79**	**5.68**	**6.84**
Alpha Pool Overlay Return (Alpha Pool + Beta)	***(10.18)***	***(10.18)***	***10.80***	***9.48***	***9.97***

(Annualized Return shown for all periods greater than 1 yr)

Excess returns may contain rounding differences
Refer to the disclosure section for additional details

SWIB STATE OF WISCONSIN INVESTMENT BOARD

Variable Trust Fund

as of December 31, 2022

Performance

Fund	Performance Start Date	Market Value ($ millions)	Net of External Manager Fee Return %				
			Calendar YTD	1 Year	3 Year	5 Year	10 Year
Variable Trust Fund	**6/30/77**	$8,439	(17.78)	(17.78)	5.07	6.54	9.82
Variable Trust Fund Benchmark			(18.06)	(18.06)	5.11	6.55	9.75
Excess			**+0.28**	**+0.28**	**(0.04)**	**(0.00)**	**+0.07**

(Annualized Return shown for all periods greater than 1 yr)

Portfolio Allocation

By Portfolio	($ millions)	As % of Total Fund		
	Total Exposure	Portfolio Exposure	Exposure Target	Target Range
Public Equities	8,407	99.61	100.00	
US Equities	5,892	69.82	70.00	65.0 – 75.0%
International Equities	2,514	29.79	30.00	25.0 – 35.0%
Cash & Overlays	33	0.39	0.00	
Total Fund	$8,439	100.00	100.00	

- ***Asset class exposures are within the Target Range***

Excess returns may contain rounding differences
Refer to the disclosure section for additional details

SWIB
STATE OF WISCONSIN INVESTMENT BOARD

Separately Managed Funds

as of December 31, 2022

Fund	Performance Start Date	Market Value ($ millions)	Net of External Manager Fee Return %				
			Calendar YTD	1 Year	3 Year	5 Year	10 Year or ITD
State Investment Fund (SIF)	**6/30/1975**	$20,281	1.61	1.61	0.72	1.26	0.79
SIF Benchmark			1.78	1.78	0.73	1.25	0.77
Excess			**(0.18)**	**(0.18)**	**(0.01)**	**+0.01**	**+0.02**
State Life Insurance Fund	**10/31/1994**	$96	(19.42)	(19.42)	(3.75)	(0.05)	1.77
No Benchmark							
Historical Society Endowment Fund	**12/31/1993**	$21	(17.97)	(17.97)	5.30	7.13	9.70
Historical Society Endowment Benchmark			(17.30)	(17.30)	5.02	6.93	9.51
Excess			**(0.67)**	**(0.67)**	**+0.28**	**+0.20**	**+0.19**
Injured Patients & Families Comp. Fund	**10/31/1993**	$1,362	(14.15)	(14.15)	(0.56)	1.87	3.24
IP&FC Benchmark			(13.87)	(13.87)	(1.00)	1.53	2.72
Excess			**(0.28)**	**(0.28)**	**+0.44**	**+0.34**	**+0.52**
UW System Long Term Fund	**3/31/2018**	$509	(14.22)	(14.22)	4.45		5.66
UW System Benchmark			(14.26)	(14.26)	4.28		5.46
Excess			**+0.03**	**+0.03**	**+0.17**		**+0.20**
UW Cash Management Fund	**4/30/2022**	$629					(2.81)
UW Cash Management Benchmark							(2.69)
Excess							**(0.12)**

(periods greater than 1 yr show annualized return, since inception returns shown for strategies with less than 10-year history)

Excess returns may contain rounding differences
Refer to the disclosure section for additional details

SWIB
STATE OF WISCONSIN INVESTMENT BOARD

Leverage Performance

As of December 31, 2022

STATE OF WISCONSIN INVESTMENT BOARD

CTF Policy Leverage Performance

as of December 31, 2022

	Net of External Manager Fee Return %			
Core Trust Fund	**Calendar YTD**	**1 Year**	**3 Year**	**5 Year**
Unlevered Returns (as estimated):				
Portfolio[1]	(10.82)	(10.82)	5.33	5.96
CTF Benchmark Return[1]	(11.28)	(11.28)	4.58	5.40
Excess Return	+0.46	+0.46	+0.76	+0.56
Portfolio Return (Unlevered)	(10.82)	(10.82)	5.33	5.96
Absolute Return from Leverage[1,2]	(2.02)	(2.02)	0.21	0.28
Implementation (+) or (-)	0.00	0.00	+0.01	+0.01
Levered Returns (as reported):				
Portfolio	(12.83)	(12.83)	5.56	6.25
CTF Benchmark	(13.29)	(13.29)	4.79	5.68
Excess	+0.46	+0.46	+0.77	+0.57

(Annualized Return shown for all periods greater than 1 yr)

Leverage notes:

[1] The Unlevered Portfolio Return, Unlevered CTF Benchmark Return, Absolute Return from Leverage and Implementation (+) or (-) are estimated

[2] Policy leverage was first introduced into the CTF and the benchmark at the end of April 2012

- Policy leverage at SWIB is implemented passively. Therefore, it generally does not contribute to active risk or excess returns[1]
- Policy leverage amplifies absolute returns (whether positive or negative), which is an important component in SWIB's strategy to meet the 6.8% actuarial target over the long-term
- The CTF benchmark return is levered to create an apples-to-apples comparison for evaluating relative performance of the CTF (i.e., excess return)

Excess returns may contain rounding differences
Refer to the disclosure section for additional details

SWIB
STATE OF WISCONSIN INVESTMENT BOARD

Callan Quarterly Report Summary

4th Quarter 2022

STATE OF WISCONSIN INVESTMENT BOARD

Callan

SWIB STATE OF WISCONSIN INVESTMENT BOARD

March 29, 2023

State Of Wisconsin Investment Board

Callan Associates Performance Reporting

Ivan "Butch" Cliff, CFA
Executive Vice President
Director of Research

What Callan is doing for SWIB

Purpose of the project and the resulting service relationship

- SWIB contacted Callan mid-2011 and expressed the desire for performance and risk analysis relative to "true" peers
- Purpose was to better understand and evaluate results compared to relevant peer funds
  - Public funds only
  - Very large in asset size to reflect both the advantages of scale as well as burdens of huge assets
  - Reasonably large sample size for robust and meaningful analysis
- Callan constructed and is maintaining a custom peer group for SWIB using our proprietary fund sponsor database that aggregates data from Callan clients and outside data vendors
- SWIB custom peer group results:
  - ~50 public funds with assets in excess of $10 BB
  - Callan continues to maintain peer group by adding new members where appropriate
- Callan supplies SWIB with a detailed quarterly report using this custom peer group
  - Asset allocation analysis (actual and policy) versus peers
  - Total fund performance and risk analysis versus target and peers
  - Asset class performance versus targets and peers
  - Presents summary results to the Board annually

Relevant Background Information on SWIB Investment Program

Important differentiating factors when evaluating strategy/performance vs. peers

- SWIB is one of the few ~100% fully-funded public funds in the US (assets >= liabilities).
- Results from strong governance, prudent and disciplined benefit/contribution policies, appropriate investment policies, and effective investment practices.
- ~100% funded status along with some benefit flexibility gives SWIB more strategic investment policy options
- Many public funds are less than 70% funded (many much less) and feel forced to take on increasing levels of equity-like risks in an attempt to close the gap.
  - Underfunded peers need to exceed actuarial returns to close their gaps (absent large contribution increases).
  - To “tread water” a 70% funded plan with a 7% return hurdle needs to generate a 10% return (7% / .70).
- SWIB only has to meet its actuarial return hurdle (6.8%) on assets to maintain fully-funded status.

Relevant Background Information on SWIB Investment Program

Important differentiating factors when evaluating strategy/performance vs. peers

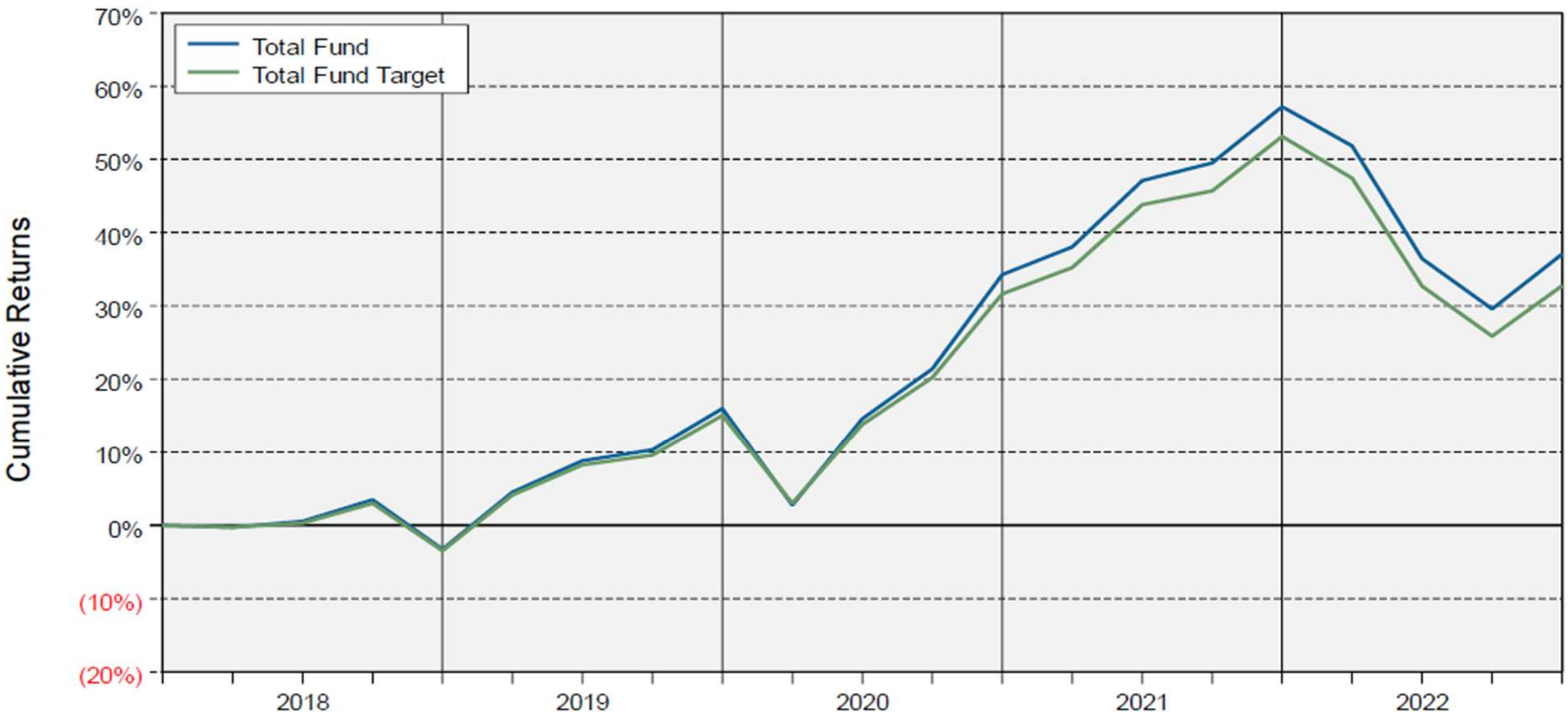
- SWIB can afford to utilize a more diversified strategic investment policy than most large public funds.
- SWIB's policy is less reliant on, and concentrated in, equity-like risks and can still meet goals.
  - Uses moderate financial leverage to diversify fund's risk exposures to better counterbalance equity-like risks.
  - SWIB uses tenets of a well-known investment strategy, Risk Parity, to construct a more risk-balanced portfolio that is more robust against equity drawdowns than traditional peer portfolios.
  - SWIB's strategy uses moderate financial leverage (~15%) to raise exposure to a conservative fixed income portfolio as a "flight to quality" hedge against volatile equity/credit market scenarios. SWIB's leverage allows for this extra fixed income and diversification without having to fund from growth assets. Most peers have less fixed income and/or more aggressive, higher risk fixed income programs to pursue higher return.
- SWIB maintains a cost-effective mix of internal and external investment management that provides a material total fund cost advantage vs. peers.

SWIB Performance Reporting

Gross of Fees as of 12/31/22

5 Year Cumulative Returns vs. Target (Gross, 12/31/22)

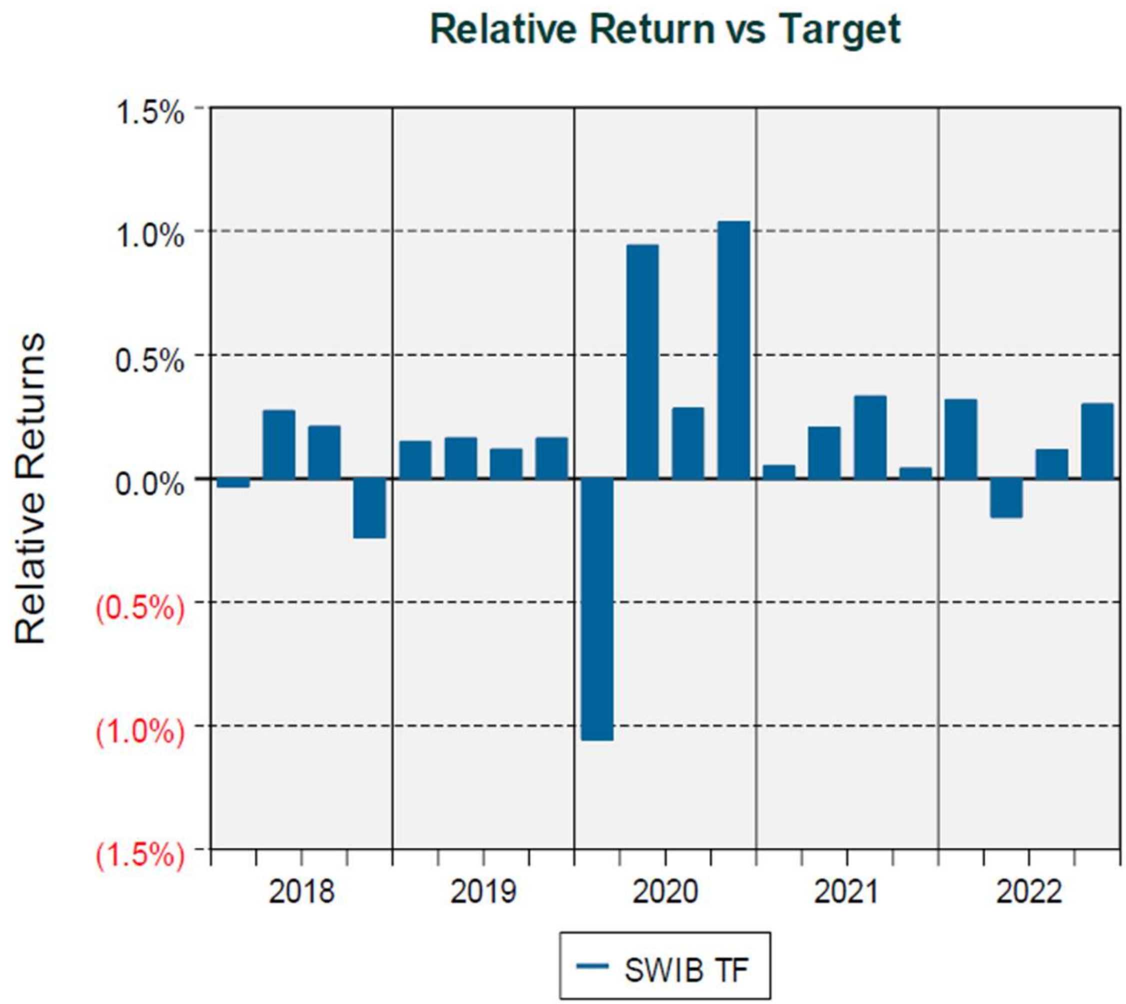
Cumulative Returns Actual vs Target



- **Over last five years SWIB generated absolute returns of 6.51% annualized, trailing its current actuarially required return of 6.8% by -29 bps. The target policy return of 5.83% trailed the actuarial return by -97 bps.**
- **SWIB has added value above it's target policy return with excess returns of +68 bps annualized, resulting in a cumulative excess return of +4.32%.**
- **Results generated with high diversification and very low tracking error due to robust risk management.**

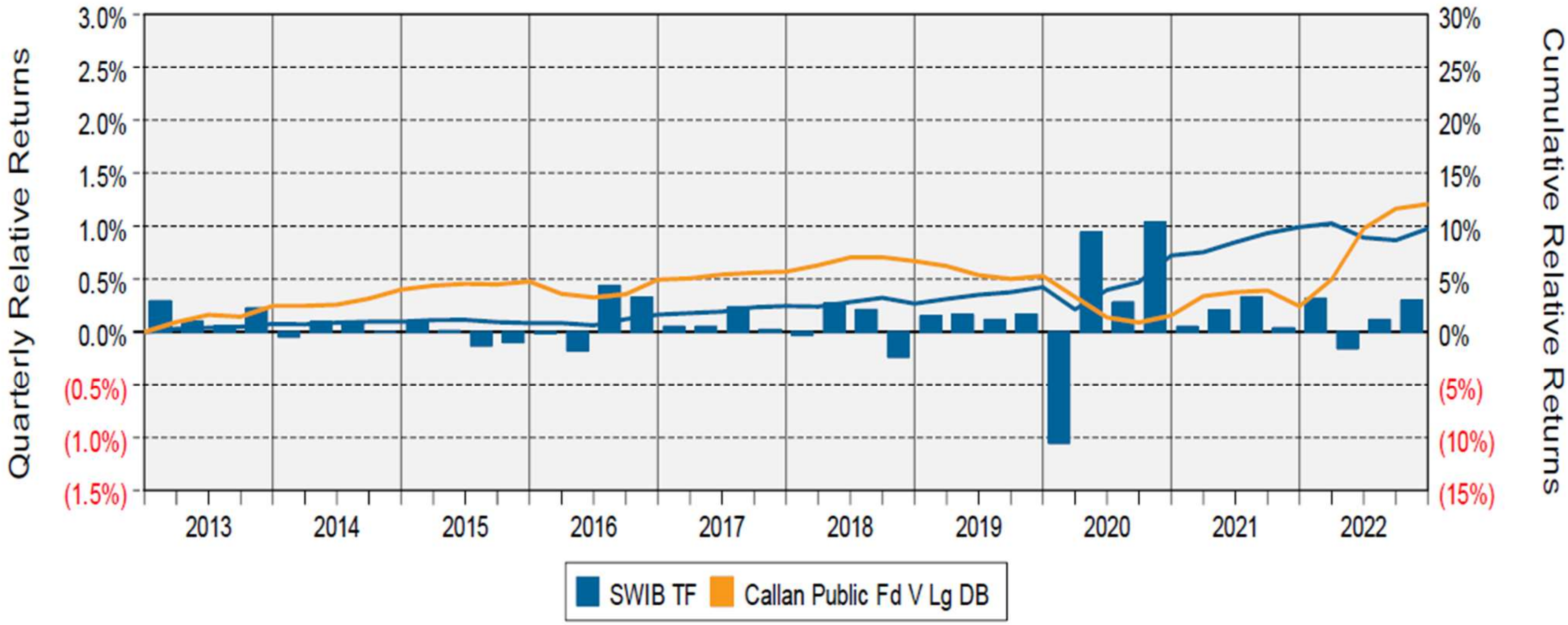
5 Year Return Consistency vs. Target (Gross, 12/31/22)

- Highly controlled tracking error relative to target (note small scale).
- Consistent positive excess returns over last 5 years with a 80% batting average (16/20 qtrs).
- Consistency and risk control resulted in a relatively smooth ride to excess return of +68 bps annualized over last 5 years.
- Strong 3 year results with excess return of +84 bps annualized and 83% batting average (10/12 qtrs).
- The trailing 1 year outperformance was +49 bps with a 75% batting average (3/4 qtrs.)
- Continuation of the normally low tracking error relative to the more extreme markets of 2020.



10 Year Return Consistency vs. Target (Gross, 12/31/22)

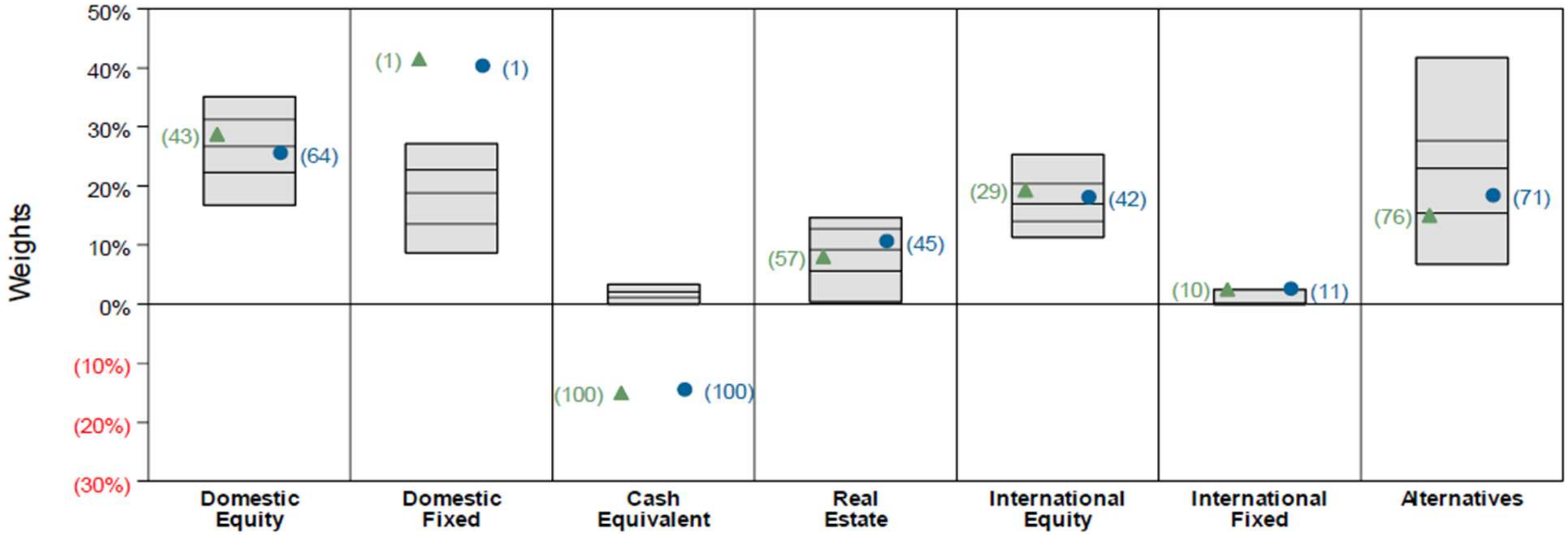
Cumulative and Quarterly Relative Returns vs Target



- Longer 10 year time frame shows similar consistency and risk control.
- Smooth accumulation of excess return over very long time periods.
- Annualized 10 year excess return of +52 bps resulting in a cumulative excess return of +9.80%.
- Both actual return of 7.55% and policy target return of 7.03% exceed current actuarially required return of 6.80%.

Asset Allocation Comparison to Custom Peer Group (12/31/22)

Asset Class Weights vs Callan Public Fund Spons- V Lg DB (>10B)

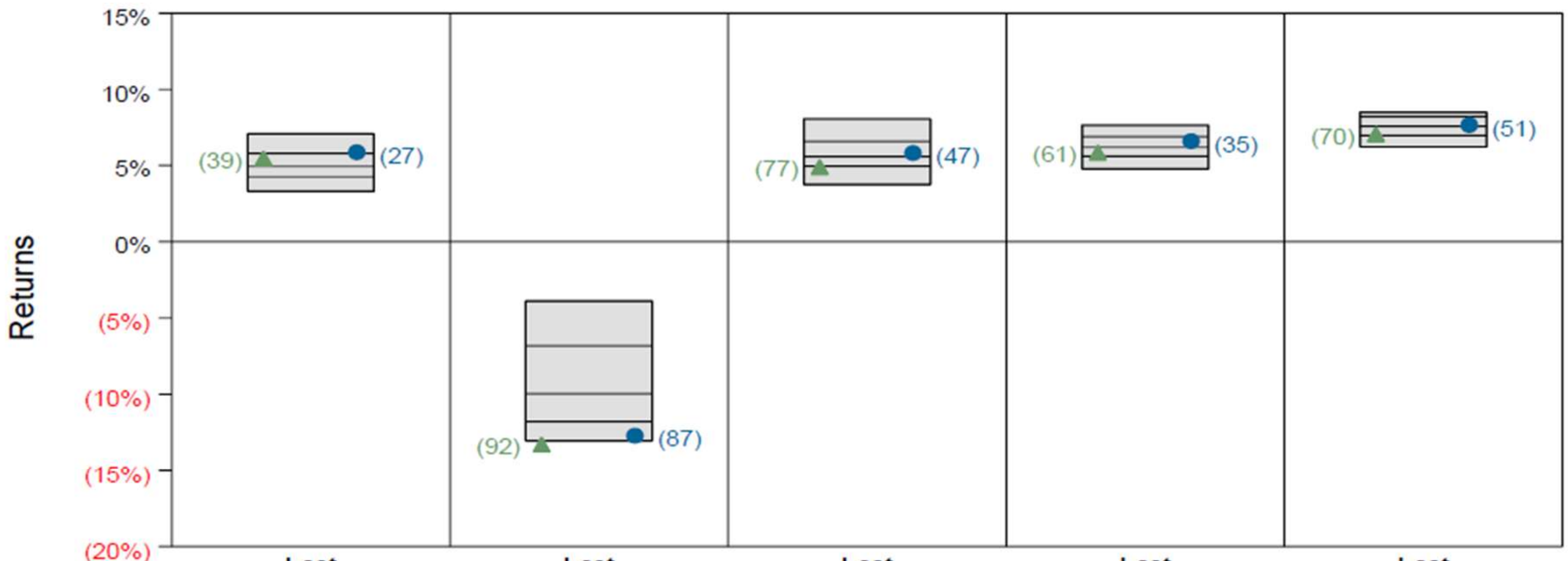


	Domestic Equity	Domestic Fixed	Cash Equivalent	Real Estate	International Equity	International Fixed	Alternatives
10th Percentile	35.16	27.13	3.31	14.62	25.28	2.49	41.76
25th Percentile	31.19	22.69	2.09	12.76	20.38	0.22	27.60
Median	26.65	18.82	1.16	9.23	16.97	0.00	22.95
75th Percentile	22.26	13.54	0.06	5.63	14.00	0.00	15.37
90th Percentile	16.73	8.65	0.00	0.38	11.28	0.00	6.76
Fund ●	25.39 (64)	40.20 (1)	(14.62) (100)	10.48 (45)	17.93 (42)	2.42 (11)	18.21 (71)
Target ▲	28.71 (43)	41.50 (1)	(15.00) (100)	8.00 (57)	19.29 (29)	2.50 (10)	15.00 (76)

- **SWIB's use of financial leverage (now 15%) enables more risk reducing/diversifying assets w/o sacrificing growth assets.**
- **This somewhat unique strategy is a more diversified and risk-balanced portfolio than most peers.**
- **Much more fixed income in US especially, and Int'l as a hedge against equity-like risks (and using less risky fixed income).**
- **Slightly less illiquid non-real estate "Alternatives" (Private Equity, Private Credit, Hedge Funds, etc.) than large peers.**

Cumulative Performance Rankings vs. Peers (Gross, 12/31/22)

Callan Public Fund Spons- V Lg DB (>10B)

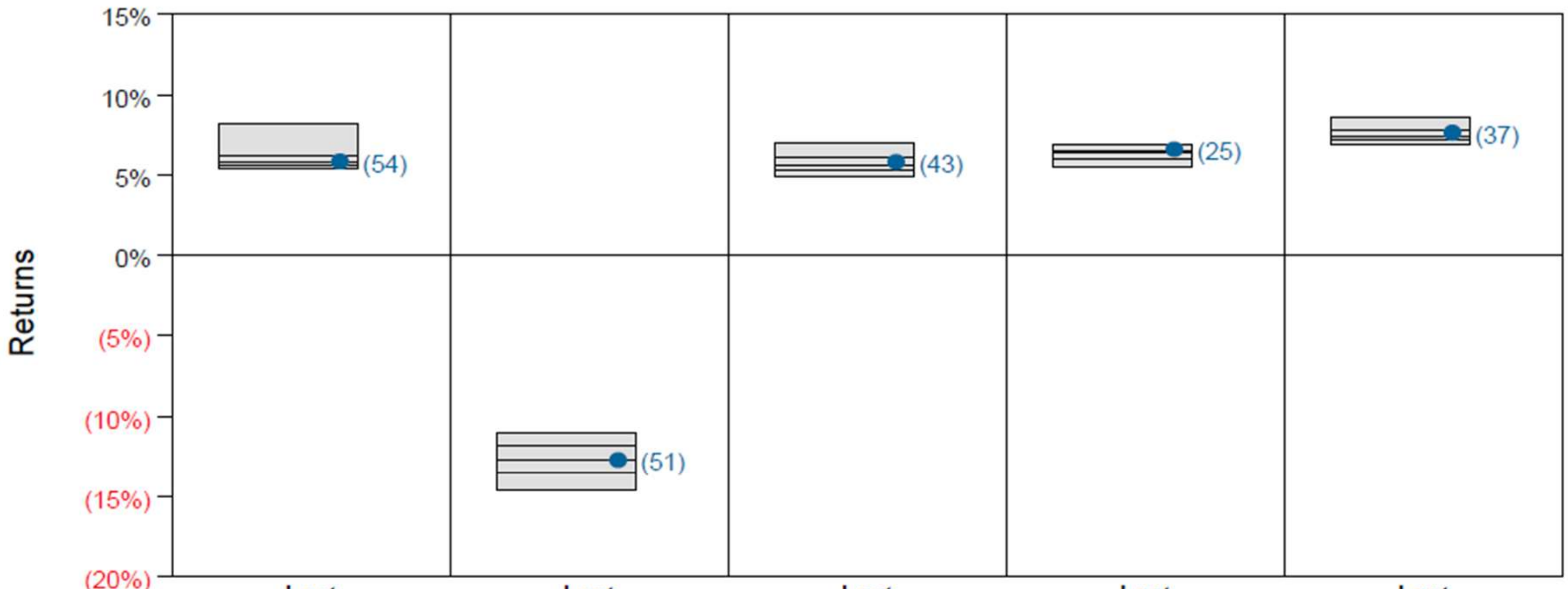


	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
10th Percentile	7.05	(3.89)	8.03	7.63	8.47
25th Percentile	5.77	(6.82)	6.57	6.88	8.19
Median	4.93	(9.96)	5.58	6.18	7.57
75th Percentile	4.25	(11.79)	4.94	5.60	6.95
90th Percentile	3.30	(13.03)	3.74	4.75	6.21
Total Fund ●	5.77	(12.80)	5.72	6.51	7.55
Policy Target ▲	5.45	(13.29)	4.88	5.83	7.03

- Actual total returns above policy target returns for all periods shown.
- Near median 3, 5, 10 year rankings entirely due to value-add above target, as policy target return trailed peers.
- SWIB's policy significantly trailed peers in 2022, changing past top-quartile long-term rankings to more median levels.

Callan Proprietary Allocation Adjusted Ranking vs. Peers (Gross, 12/31/22)

Asset Allocation Adjusted Ranking

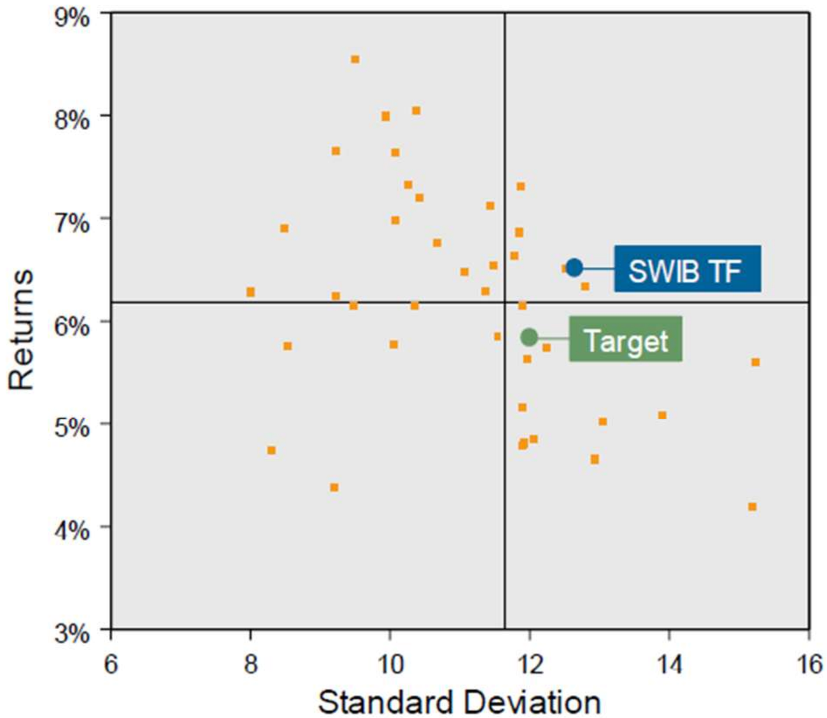


	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
10th Percentile	8.17	(11.03)	7.03	6.90	8.58
25th Percentile	6.17	(11.87)	6.05	6.51	7.80
Median	5.79	(12.75)	5.57	6.34	7.42
75th Percentile	5.58	(13.52)	5.26	6.03	7.19
90th Percentile	5.36	(14.60)	4.87	5.48	6.90
Total Fund ●	5.77	(12.80)	5.72	6.51	7.55

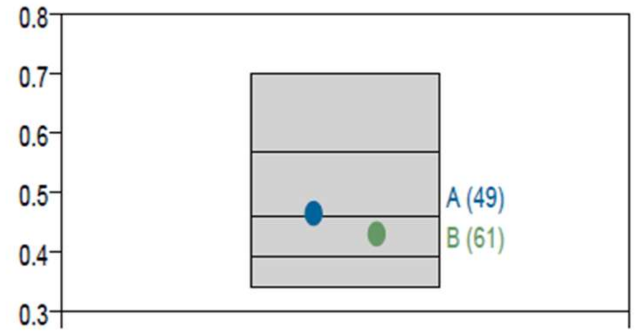
- **Asset allocation adjusted ranking adjusts peers to match SWIB's more risk-balanced asset allocation (inc. leverage). Result is a risk-adjusted peer ranking not dominated by asset allocation, reflecting the quality of program implementation.**
- **Adjusting for SWIB's unique asset allocation policy relative to peers explains poor 2022 unadjusted ranking (now median).**
- **Asset allocation adjusted peer rankings are above median over all medium to long periods. Program well implemented.**

Absolute Risk / Reward Tradeoff vs. Peers (Gross, 12/31/22)

Callan Public Fund Spons- V Lg DB (>10B) (Gross)
Annualized Five Year Risk vs Return



Sharpe Ratio vs. Callan Public Fund Spons- V Lg DB (>10B)

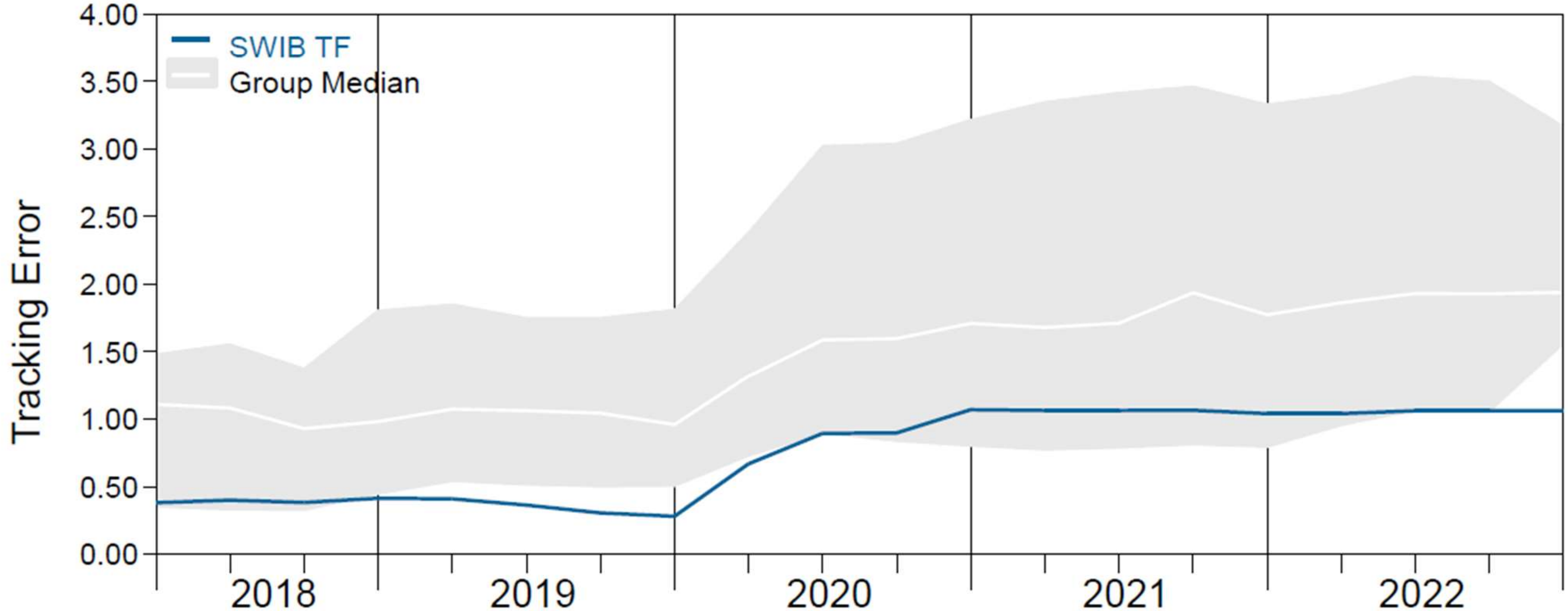


	Last 5 Years
10th Percentile	0.65
25th Percentile	0.52
Median	0.41
75th Percentile	0.34
90th Percentile	0.29
SWIB-Total Fund A	0.41
SWIB-Total Fund Target B	0.38

- **Policy Target had slightly more risk and a lower return (-35 bps) than peer median (crosshairs).**
- **Actual implementation (SWIB TF) added some more risk and extra return over target (+68 bps) and peers (+33 bps).**
- **Absolute risk/reward tradeoff (Sharpe Ratio) at median even with more risk. Risk/return tradeoff is competitive.**
- **Peer Sharpe Ratios benefited from slightly higher private markets exposures (artificially low observed risk, high return).**

Tracking Error (active risk) vs. Target and Peers (Gross, 12/31/22)

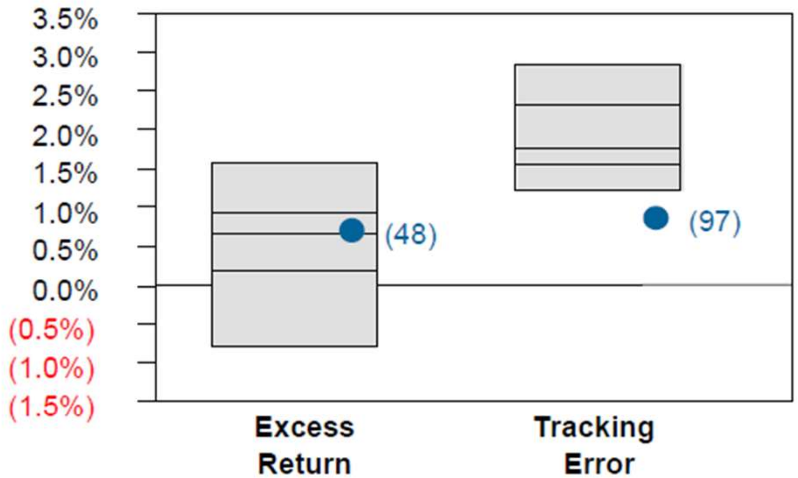
Rolling 12 Quarter Tracking Error vs Targets vs. Callan Public Fund Sponsor - Large



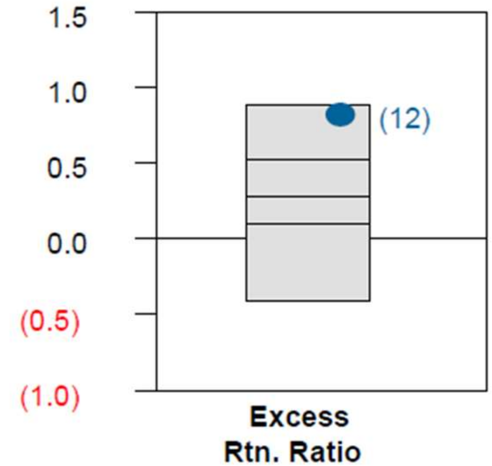
- **Strong risk control practices result in consistently much lower tracking error than peers have versus their policy targets.**
- **SWIB's tracking error is consistently in or near bottom decile vs. peers and less than half of median peer tracking error.**
- **Less chance of materially underperforming policy target. Focused on consistency of results (singles/batting average vs. home runs/strikeouts).**

Relative Risk/Reward Tradeoff vs. Target and Peers (Gross, 12/31/22)

Risk Statistics Rankings (Gross) vs Large Public Funds
Five Years Ended December 31, 2022



	Excess Return	Tracking Error
10th Percentile	1.57	2.84
25th Percentile	0.93	2.32
Median	0.66	1.75
75th Percentile	0.18	1.56
90th Percentile	(0.80)	1.21
SWIB TF ●	0.68	0.84

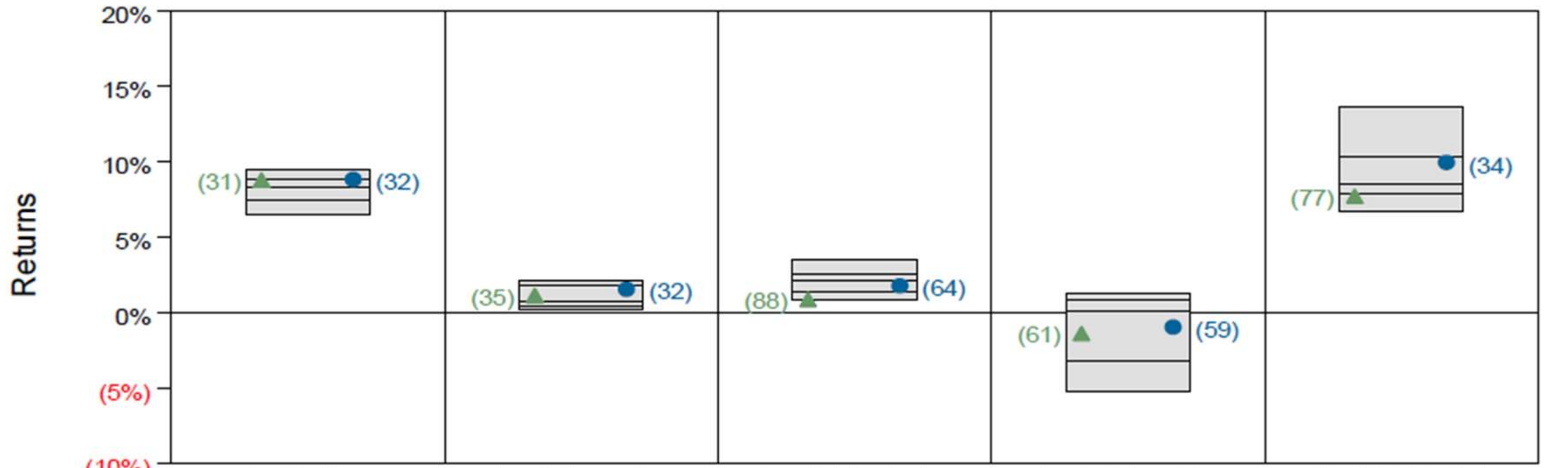


	Excess Rtn. Ratio
10th Percentile	0.89
25th Percentile	0.52
Median	0.28
75th Percentile	0.10
90th Percentile	(0.41)
SWIB TF ●	0.81

- **Positive Excess Returns, above median vs. peers, without taking near as much active risk from policy target as peers.**
- **Consistently very low Tracking Error versus policy target in absolute terms and relative to peers.**
- **Combination results in top quartile Excess Return Ratio (aka Information Ratio) rankings. Risk/return tradeoff is great.**

Asset Class Comparisons vs. Targets and Peers (Gross, 12/31/22)

Total Asset Class Performance
Five Years Ended December 31, 2022



	Lg Public Funds DE	Lg Public Fd - Dom Fixed	Lg Public Fd - Int Equity	Lg Public Fd - Intl Fixed	Lg Public Fd - Real Est
10th Percentile	9.53	2.12	3.54	1.30	13.65
25th Percentile	8.89	1.83	2.57	0.86	10.31
Median	8.32	0.71	2.12	0.13	8.57
75th Percentile	7.46	0.39	1.38	(3.23)	7.85
90th Percentile	6.50	0.21	0.82	(5.25)	6.66
Asset Class Composite ●	8.76	1.48	1.70	(1.02)	9.88
Composite Benchmark ▲	8.79	1.15	0.88	(1.36)	7.72

- **4/5 asset classes outperformed their targets over 5 years. US Equity slightly trailed its target but did very well vs. peers.**
- **3/5 asset classes rank above median vs. peers. Int'l Equity and Int'l Fixed trailed peers but both beat their benchmarks.**
- **US Fixed Income now ranks well-above median vs. peers. It has historically ranked below median due to low-risk nature of SWIB's fixed income program. Market volatility in 2020 and 2021 benefitted this conservative structure relative to peers who pursued higher risk fixed income programs.**

Biographical Information

Ivan "Butch" Cliff, CFA, is an Executive Vice President and Director of Research. He is responsible for the following groups: Global Manager Research, Capital Markets & Alternatives Research and Published Research. Butch is a member of Callan's Management, Client Policy Review, Institute Advisory and Alternatives Review Committees. He is also a Portfolio Manager and member of the Investment Committee that oversees all of Callan's discretionary multi-manager solutions. Butch is a shareholder of the firm.

Butch joined the Programming Group of Callan in 1989 and was instrumental in developing sophisticated performance analytics as well as solutions to data processing and management problems. In 1993 he became the Manager of the Database Group with responsibility for coordinating the design and implementation of performance measurement operations as well as overseeing the development and maintenance of Callan's databases. Butch was made Director of Operations in 2000 and has responsibility for the management and development of all Callan's performance monitoring systems and personnel. In 2007, Butch became the Director of Investment Research & Operations with responsibilities expanded to include oversight of Callan's Global Manager Research activities.

Prior to joining Callan, Butch worked for two years at Gifford Fong Associates developing analytical software for fixed income money managers.

Butch earned a BA in Economics from the University of California at Berkeley and earned the right to use the Chartered Financial Analyst designation.

Report Disclosures

Glossary, Definitions & Data Sources

STATE OF WISCONSIN INVESTMENT BOARD

Report Disclosures

Key Terms and Portfolio Return Information

Term	Description / Definitions
Gross of Fee Return ("GoF Return")	The returns generated in investment portfolios (or accounts) that reflect the deduction of transaction expenses incurred as a result of executing a trade or acquiring or disposing of the investment. In some instances, these expenses are not readily separable from the cost of the investment and are not distinctly recorded within accounting records invoiced by third parties. Security lending income is included in GoF return (however, Security Lending expense is not). Starting on 1/1/2021, the SWIB practice of "grossing up" external management fees, performance fees and any identifiable carried interest by crediting the investment accounts was discontinued. The use of GoF Return is limited to performance comparison to gross benchmark returns, long term CTF / VTF return periods where GoF is the sole return type available and for the purpose of fulfilling data submissions to consultants for peer performance comparison purposes.
Net of Fee Return ("NoF Return")	The GoF return that reflects additional deductions for external management fees, performance fees and any identifiable carried interest incurred in investment portfolios. SWIB has account records to support NoF return history over approximately 20 years.
Net of All Return ("NoA Return")	The NoF return that reflects additional deductions for administrative expenses, categorized by SWIB as either Direct or Indirect expenses, that are permitted to be charged directly to the Trust Funds under statutory authority. The Cost Allocation Protocol governs the allocation methods and booking processes to allocate expenses at the investment account level. Examples of the type of expenses that fall under this category, include custody and banking fees, general operating expenses and investment consulting services. Security Lending expense is included in NoA Return. The recording of official, NoA return at the portfolio or account level began in 1/1/2017.
Annualized Return Calculation	SWIB reports containing portfolio and benchmark return calculations for time periods greater than 1 year generally utilize a geometric averaging calculation. Returns shown for periods of less than 1 year are not presented utilizing the annualization calculation method. In this instance, compound returns are reported for the specified calendar period (e.g., month to date, quarter to date or year to date). ***Annualized Return = ((1 + r^1) x (1 + r^2) x (1 + r^3) …) ^ (calendar units / time interval measured) – 1***; $r^{(n)}$ = series of holding period returns and calendar units are often expressed as days, months or years
Cumulative Return Calculation	SWIB uses the cumulative return calculation ("cumulative basis") to reflect the aggregate amount an investment has gained or lost over time for portfolios and benchmarks. This measurement shares aspects of the annualized return calculation, however, it excludes the geometric averaging. **Cumulative Return = ((1 + r^1) x (1 + r^2) x (1 + r^3) …) – 1;** $r^{(n)}$ = series of holding period returns

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Key Terms and Portfolio Return Information

Term	Description / Definitions
Excess Return % ("Excess)	Portfolio return or security level return minus the benchmark return. Portfolio or Composite Returns are generally compared against benchmarks with a similar level of risk. It is widely used as a measure of the value added by the portfolio or investment manager or the manager's ability to outperform the market.
Net Excess Value Add $ ("NEVA")	Net Excess Value Add $ ("NEVA") calculates the portfolio's performance return in total dollars relative to a benchmark. NEVA is a measure used to assess the value-add dollars that a particular investment strategy or team generated over specified time periods. NEVA is also used to monitor the return objectives set forth in the annual Active Risk Budget which is prepared for the CTF and VTF funds managed by SWIB.
SWIB Inception To Date Reporting	The Quarterly Performance Summary discloses a reporting period described as **10 years or ITD**. The return disclosed in this reporting field yields either 10-year annualized returns for funds or portfolios with at least 10 years of return history or the data field may revert to the return since inception for portfolios with less than 10 years of history. The quarterly report provides a performance start date for those portfolios with the abbreviated return history.
Performance Start Date	The date denotes the initial period of a portfolio or composites' return data series that is stored and calculated by the SWIB Performance Measurement Service Agent.
Time-weighted Rate of Return	A method of calculating period-by-period returns that reflects the change in value and negates the effects of external cash flows. This methodology is applied to portfolios that are processed with daily frequency and where daily valuation updates of the underlying instruments are available.
Modified Dietz Total Rate of Return	A measurement that evaluates a portfolio's return based on a weighted calculation of its cash flow. The method considers the timing of cash flows and assumes a constant rate of return over the specified time period. This methodology is applied to portfolios and composites that are processed with monthly frequency (and where only monthly valuation updates are available).
Policy Benchmark	The Fund level Benchmark as approved by the Benchmark Committee. The Benchmark is composed of multiple indices that reflect the Fund's exposure to a diverse set of investment strategies. (can also referred to as "Policy Target" as implemented through SWIB's Asset Allocation plan).
Reference Portfolio	Hypothetical global portfolio comprised of 60% MSCI World Net (using a SWIB custom net variant as of 2010) and 40% Bloomberg Barclays Government Credit Index. The return is presented on a gross of fee basis and assumes no contributions or withdrawals.

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Key Terms and Portfolio Return Information

Term	Description / Definitions
Custom weighted or calculated benchmarks	SWIB managed funds and / or portfolios may require the construction of custom benchmarks that are created through applying static or asset weighted calculations to achieve a blended benchmark that is representative of the investment strategy. When available or feasible, SWIB will request its third-party benchmark data provider(s) to blend benchmarks as a part of the market data service. If this option is not available, SWIB will calculate the benchmark using market data inputs. In certain cases, SWIB may customize a benchmark to more accurately reflect the SWIB managed Fund's tax status and actual tax rate experience in non-U.S jurisdictions with investment portfolio with-holding taxes applicable to dividends and capital gains. This type of custom benchmark is designated as "SWIB Custom Net".
Gross Market Value	The price at which the fund investor can buy or sell the underlying investment instruments held in the portfolio at a given time multiplied by the quantity held, plus any accrued income. The Gross Market Value of a portfolio is the market value of the portfolio or composite without any deduction for SWIB expenses.
Total Exposure	For SWIB managed funds governed by the WRS Investment Policy, this measure reflects the total value of the fund's exposure to investable markets by asset class and sub asset class. Total Exposure is inclusive of those instruments utilized under the WRS Leverage Use Policy to achieve the asset exposures approved under the asset allocation strategy and active risk target.
Internally Managed Portfolios	Portfolios managed by SWIB investment professionals. Each internal portfolio is assigned compulsory investment guidelines and is also assigned "soft risk parameters." Soft risk parameters refer to desired characteristics and/or risk exposures.
Externally Managed Portfolios	Portfolios managed by third-party investment managers hired by SWIB. External active and passive managers operate under contractual investment guidelines approved by SWIB's Investment Committee or by SWIB's investment management staff, as designated in the Investment Committee Charter.
Active Management	Actively managed portfolios have the objective of out-performing their respective benchmarks (or generating alpha) by using investment insights or quantitative tools to deploy buy, hold, and sell decisions. This style of management will result in portfolio positioning decisions that will add active risk and generate higher tracking error. Actively managed portfolios are governed through investment guidelines and soft risk parameters.
Passive Management	Passively managed portfolios have the objective of closely tracking the returns and risk of their respective benchmarks. This style of management usually involves mirroring the benchmark security holdings (or constituents) to closely replicate the benchmark risk and return.

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Key Terms and Portfolio Return Information

Term	Description / Definitions
Note on report data sources	Return Calculations Bank of New York Mellon, Global Risk Services (BNYM GRS), an independent 3rd party, provides services related to custodial records, accounting and performance return calculations for SWIB managed funds. BNYM also serves as the source for certain standard, market-based benchmarks and static weight blended benchmarks. Benchmark Market Data and Selection Process The data source for this information is provided by multiple investment industry market data vendors and analytics firms depending on the investment strategy. The SWIB Benchmark and Performance Committee governs the benchmark selection process. An independent consultant (selected by the Board of Trustees or "Board") makes recommendations to initially select or change benchmarks. Peer Rank Return Comparison Data This information is provided and processed by industry consultants that consume return information for SWIB managed funds and then provide investor universe return comparisons and analytics using proprietary databases. When consultant info is included in the Quarterly Performance Summary the preparer of the work is identified.

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Leverage Disclosures

Calculation formulas to estimate impact

Report Disclosures

Notes on CTF Leverage Analysis

Term	Description / Definitions
Portfolio Return (Unlevered)	This is an estimated-only CTF return because SWIB does not implement a CTF unlevered portfolio to calculate actual performance against. Leverage is used to expand the CTF's entire asset base. All definitions that include (unlevered) are ESTIMATES only for this reason. It is estimated by: 1) Excess Return (Levered) is first subtracted from the Portfolio Return (Levered)[1]; 2) The result of Step 1 is then divided by the Policy Leverage Factor; then 3) Excess Return (Levered) is added back to the result of Step 2 and that number is then adjusted to account for the cost of financing (i.e., the expense of acquiring leverage, which would not be applicable to an unlevered portfolio). $\textit{Portfolio Return (Unlevered)} = \left(\frac{\textit{Portfolio Return (Levered)} - \textit{Excess Return (Levered)}}{\textit{Policy Leverage Factor}}\right) + \textit{Excess Return (Levered)} - \textit{cost of implementation}$ [1] Note, because Excess Return (Levered) is the difference between two similarly "levered" portfolios (Portfolio Return (Levered) and Benchmark Return (Levered)), it represents outperformance that is not attributable to leverage. Accordingly, it is subtracted first as it would be inaccurate to reduce such amount by the Policy Leverage Factor for purposes of this calculation. Policy Leverage Factor is the amount of the approved Policy Leverage during any given period, time weighted for multi-year periods. Policy Leverage was first introduced into the CTF Portfolio and Benchmark at the end of April 2012 and was raised from 10% to 15%, effective Calendar Year 2021.
CTF Benchmark Return (Unlevered)	Estimated by the Benchmark Return (Levered) divided by the Policy Leverage Factor for the period.

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Notes on CTF Leverage Analysis

Term	Description / Definitions
Excess Return (Unlevered)	The Excess Return (Unlevered) is the excess return that it is estimated SWIB would have achieved if it did not implement leverage for the CTF. Estimated as Portfolio Return (Unlevered) minus Benchmark Return (Unlevered). Can also be estimated by taking the actual Excess Return (Levered) minus Implementation (+) or (-) (see below for definition).
Absolute Return from Leverage	Estimated by the Portfolio Return (Levered) minus Portfolio Return (Unlevered) minus Implementation (+) or (-).
Implementation (+) or (-)	The relative cost of financing (i.e., the actual cost of financing minus the CTF benchmark cost of financing). The CTF benchmark cost of financing is the CTF cash benchmark, previously LIBOR plus 30 bps and now BSBY plus 30 bps. Implementation (+) or (-) can also result from outperformance or underperformance relative to how efficiently SWIB replicates the index in connection with policy leverage (this is called basis risk). Can either be positive or negative. When the leverage implementation is achieved at a cost saving compared to the CTF cash benchmark (i.e., less than the CTF cash benchmark), it is positive (+); but when it is achieved with additional cost compared to the CTF cash benchmark (i.e., more than the CTF cash benchmark), it is negative (-). Cost savings can generate minor excess returns for the CTF. Basis risk can also generate minor contributions to or detractions from relative performance with respect to policy leverage.
Portfolio Return (Levered)	Actual performance of the CTF Portfolio for the period presented, from all strategies including Policy Leverage.
CTF Benchmark Return (Levered)	Actual performance of the CTF Benchmark for the period, taking into account the use of Policy Leverage.
Excess Return (Levered)	Actual excess return of the CTF. Portfolio Return (Levered) minus Benchmark Return (Levered).

SWIB
STATE OF WISCONSIN INVESTMENT BOARD

Board Meeting

Tab 8 – Asset Allocation Update

To: **SWIB Board of Trustees**

cc: **Edwin Denson**

From: **Joe Nankof and Chris Levell, NEPC**

Date: **March 29, 2023**

Subject: Asset Allocation Recommendation

For the past two years, the CTF Public Equity Benchmark has been based on the MSCI ACWI IMI Index, with a half weight to China large cap. The intent is to invest in the broad market portfolio, while maintaining the long-term underweight to China.

In operation, the sub-asset class splits were approved as static weights by the Trustees each December, and then used as rebalancing targets each month. The market capitalization splits across equity markets can be volatile, so these rebalancing activities have sometimes been substantial.

As you recall, in December 2022 it was recommended to the Board that the Public Equity sub-asset class targets would be aligned to the capitalization weighted ACWI IMI (half-weight China large cap) during 2023. The goal of this memo is to outline the timing, frequency and process for updating the custom capitalization weighted benchmark and sub-asset class weights throughout the year as we transition to this new approach.

As discussed in December, we believe it is now appropriate to formalize the MSCI ACWI IMI Index (half-weight China large cap) as the CTF Public Equity Benchmark as of March 31, 2023. At some point during 2023, MSCI will prepare a custom index for tracking purposes and Staff is preparing to be operationally ready for the change. Until this custom benchmark is created by MSCI, staff will maintain sub-asset class weights and manage the portfolio consistent with the methodology described herein. With this change, we would expect to see generally smaller transactions and costs for monthly rebalancing. Once the custom benchmark is created by MSCI, we would no longer ask the Trustees for sub-asset class approval in public equities.

The updated approach requires us to define a methodology for periodically updating the benchmark to maintain the intended alignment with global market capitalization weights. Any recommended methodology should consider and balance both, 1) the desire to consistently track the global market capitalization through time, and 2) avoid benchmark updates which would be operationally cumbersome to implement, monitor and track.

With the above competing objectives in mind, we are recommending an approach to update the sub-asset class weights until MSCI provides the custom benchmark consistent with the methodology MSCI will use in the creation of the benchmark as follows:

Recommendation: For asset allocation and benchmarking purposes, the CTF public equity sub-asset class targets will be updated monthly to align with the MSCI ACWI IMI (half-weight to China) beginning March 31, 2023.

Board Meeting

Tab 9 – Committee Open Session Business

A. Amendments to WRS Investment Committee Investment Guidelines

B. Approved Open Session Investment Committee Meeting Minutes of November 22, 2022; December 15, 2022 and January 24, 2023 Meetings

C. Final Open Session Agenda for February 23, 2023 Meeting and Draft Open Session Agendas for March 30, 2023 and April 25, 2023 Meetings

D. Draft Open Session Minutes of November 30, 2022 Enterprise Risk and Compliance Committee meeting

SWIB STATE OF WISCONSIN INVESTMENT BOARD

SWIB Investment Committee

WISCONSIN RETIREMENT SYSTEM INVESTMENT GUIDELINES

Revised as of

~~September 27, 2022~~

February 23, 2023

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I. INTRODUCTION

The SWIB Board of Trustees (the "Board") has delegated to the investment staff of SWIB standing authority to manage the assets of the Core Retirement Trust Fund (the "Core Fund") and the Variable Retirement Trust Fund (the "Variable Fund"), which together make up the Wisconsin Retirement System (the "WRS"), pursuant to the Board's WRS Investment Policy and to section 25.15(2) of the Wisconsin Statutes and section IB 2.02 of the Wisconsin Administrative Code. The Investment Committee was created to provide oversight of WRS[1] investments within the parameters established by the Board and pursuant to the Investment Committee's Charter approved by the Board. To properly and prudently execute its delegated authority and oversight functions, the Investment Committee has established guiding policies, guidelines and procedures, which are set forth in this document, the Investment Committee Investment Guidelines (these "IC Guidelines"). These IC Guidelines articulate the policies and guidelines that are employed in the day-to-day management of the WRS assets by SWIB's staff. This document will be reviewed periodically and updated as necessary by the Investment Committee to reflect changes in investment strategies and to reflect best industry practices for prudent investors. Notwithstanding the delegation of authority by the Board to the Investment Committee for the establishment, approval, and amendment of the policies, guidelines and procedures included in these IC Guidelines, the Board reserves all rights to modify and amend these IC Guidelines at any time in its discretion. Any changes to these IC Guidelines will be periodically reported to the Board. In addition to these IC Guidelines, SWIB staff may also have to comply with Risk, Compliance Division or legal requirements, and review operational readiness with Operations staff prior to the trading of the instruments and securities authorized herein.

II. LEVERAGE USE POLICY

Introduction

Leverage is an exposure to an asset that is not fully collateralized by cash assets or an exposure to an asset acquired that has not been fully funded. Leverage by itself does not necessarily create additional market risk or variation in market returns. Leverage may result in greater diversification and lower market risk than an unlevered portfolio under normal market conditions. The funds managed by SWIB can have exposure to leverage through different structures, instruments and vehicles.

SWIB uses leverage in two primary ways. The first is to express the overall policy asset allocation, which includes leverage ("Policy Leverage"). Generally, Policy Leverage is implemented passively. The total amount of Policy Leverage is approved by the Board through the WRS asset allocation process. The Board-approved asset allocation targets for each asset class together with the approved Policy Leverage is called the "Policy Portfolio." The second use of leverage is to fund the alpha pool ("Alpha Pool Leverage"), which overlays alpha-producing strategies on the overall Core Fund Policy Portfolio. Those alpha strategies are funded with additional

[1] The Investment Committee also has oversight of the State Investment Fund and other funds managed by SWIB as described in the Board's SIF and Separately Managed Funds Investment Policy and Guidelines.

leverage but are not part of the Policy Portfolio. The total amount of Alpha Pool Leverage is limited by the Board-approved active risk target and range.

Certain internal active portfolios are also authorized to use portfolio-specific leverage. The Core Fund may provide limited unallocated cash to such internal active portfolios, and to other portfolios, to fund short-term financing needs, and charge a market-based funding rate to the applicable portfolio. Active internal and external portfolios may also fund portfolio leverage by financing assets within the portfolio.

Use of leverage introduces distinct liquidity risk that can vary based on leverage sources and margin requirements. Often, leverage requires liquid assets to satisfy margin obligations. Liquidity risk is managed by monitoring the level of liquidity required in various market scenarios and ensuring that an adequate reserve of liquid assets is available to meet commitments in times of market stress. Having a variety of leverage sources diversifies the ~~liquidity~~refinancing risk and mitigates cost under varied market scenarios.

~~Leverage may be generated using derivative instruments (such as futures, forwards, options, and swaps), through the use of repurchase agreements (repo) to borrow capital against fully paid assets, or by explicit borrowing through other capital markets mechanisms (such as lines of credit, debt issuance or securities lending). Sources of leverage are evaluated based on liquidity risk, counterparty risk, cost, and stability. The balancing of these dimensions can vary through time as market conditions vary, especially with respect to liquidity.~~

Alpha Pool and Policy Leverage can be generated through several different mechanisms. These mechanisms may be utilized in different proportions given market conditions and asset allocations. Each of these mechanisms have unique counterparty dynamics and risks, all of which are addressed by SWIB's counterparty risk framework.

> **Derivative Instruments**. Leverage can be gained by replacing a physical instrument with a derivative instrument such as a futures contract, a swap contract, or a forward contract. Most of the proceeds generated from the sale of the physical instrument can then be used to finance further investment. The cost of the leverage is imbedded in the price of the derivative instrument. Use of derivative instruments provides the ability to source large scale leverage across many different asset classes in a standardized format. There is a risk of tracking error, or basis risk, between the physical instrument and the derivative instrument that could result in the returns of the two instruments diverging.
>
> **Securities Lending Cash Collateral**. Through the course of securities lending, cash collateral may be received from borrowers. This cash may be used to finance leverage needs without creating basis risk. The available cash fluctuates day to day and is governed by the borrowing demand of and choice of collateral posted by market participants.
>
> **Repurchase Agreements (Repo)**. Repo is another way to gain leverage from physical instruments, like securities lending, without using derivative instruments. While securities lending relies on borrowing demand for the physical instrument, repo can

generate leverage from physical instruments that do not have borrow demand, and also creates zero basis risk. The repo and the underlying asset management may be executed internally, externally or a mix of the two. An agency repo model can be used to facilitate operational scale, collateral efficiency, and market access by partnering with an external agent.

Secured Borrow Agreements. Physical instruments can be pledged as collateral in a secured borrow agreement to gain financing from a bank or other financial institution, as and when needed. This form of financing creates zero basis risk and may have maturities ranging from three to six months. The stability of the available capital can vary based on the financing bank's or financial institution's balance sheet constraints.

New mechanisms may be added from time to time and included herein.

Leverage Use Philosophy

Leverage is used where it can improve investment portfolio efficiency in terms of return for risk versus alternative choices that do not use leverage. Leverage will also be used to improve portfolio diversification and reduce portfolio concentration.

Leverage Monitoring

Detailed reporting is regularly (i.e., daily, monthly and quarterly) produced by SWIB to provide feedback regarding leverage exposures for review by portfolio managers, the head of Asset and Risk Allocation (ARA), the Risk Management Division, and the Executive Director/Chief Investment Officer (ED/CIO). Leverage use risk metrics are reported at least quarterly to the Investment Committee. Leverage use is also periodically reported by the ED/CIO to the Board.

Policy and Alpha Pool Leverage Guidelines

1. Leverage ratios govern leverage derived from beta sources (i.e., from levered asset class exposures). Established leverage ratio ranges for each levered asset class are set forth below. Current Leverage Ratio is defined as the ratio of notional exposure to capital available in the portfolio (or total exposure to unencumbered exposure in the case of repo). If the Current Leverage Ratio for any levered asset class exceeds the Maximum Target Leverage Ratio, SWIB will, within 30 days (unless such time limit is waived with majority approval of the rebalancing task force), reduce exposure or add capital to bring the Current Leverage Ratio within the established range. A Current Leverage Ratio below the Minimum Target Leverage Ratio will be monitored as part of the overall optimization of capital and funding costs.

Levered Asset Class	**Minimum Target Leverage Ratio**	**Target Leverage Ratio**	**Maximum Target Leverage Ratio**
US Large Cap Equity	2.7	3.3	4.0
US Small Cap Equity	2.7	3.3	4.0
MSCI World xUS Equity	2.7	3.3	4.0

US TIPS	6.0	8.0	10.0
US Treasuries	8.0	10.0	12.0

III. DERIVATIVES USE POLICY

Introduction

A "derivative instrument" is an investment instrument which usually derives its value and marketability from an underlying instrument which represents direct ownership of an asset or a direct obligation of an issuer (e.g. a "spot" or cash market instrument). SWIB recognizes that derivatives provide a means through which SWIB can implement investment strategies in a more cost and time efficient manner than through the physical investment of the underlying securities. Additionally, derivatives can be used to facilitate SWIB's risk management activities including risk mitigation. Derivatives include such instruments as futures, swaps, options and currency forwards and may be exchange traded, traded over-the-counter (OTC) and/or cleared.

Derivatives Use Objectives

The overall strategic objective of SWIB's use of derivatives is to facilitate risk exposure management and to manage the cost of investing. Objectives for derivatives use include:

1. Constructing portfolios with risk and return characteristics that could not efficiently be created using underlying physical securities,
2. Changing systematic exposures without executing trades in the underlying physical securities,
3. Hedging or managing risks, and
4. Effecting varying active and passive investment strategies including, but not limited to: portable alpha, currency hedging, equitization, relative value trades, transition management, and rebalancings.

Derivatives Use Monitoring and Reporting

Derivatives use exposures will be monitored by portfolio managers that employ derivatives, the ED/CIO and the Risk Management Division. The Investment Committee will monitor derivatives use exposures and risk metrics on a quarterly basis or more frequently as needed.

Derivatives Guidelines Applicable to all WRS Internal Portfolios:

1. Exchange-traded derivatives must be traded on a recognized exchange approved by the Investment Committee, except for exchange-traded derivatives that are traded pursuant to Exchange for Related Position (EFRP) transactions, which are traded off-exchange and not subject to this requirement. Such approved exchanges are listed on *Appendix 1*. As additional exchanges are approved *Appendix 1* shall be updated without amendment to these IC Guidelines.

2. OTC derivatives may only be traded with counterparties with which SWIB has a current International Swap and Derivative Association (ISDA) agreement that includes a Credit Support Annex (CSA).

   In addition:

   a) The counterparty, or its guarantor, must, on each date on which a transaction is entered into, have an actual credit rating of not less than: (1) "A2/P2" on short-term debt from S&P or Moody's; and/or (2) "Baa2/BBB" on long-term debt from S&P or Moody's.
   b) The collateral that SWIB holds under a CSA may be invested in the following:
      i. Bank deposit accounts;
      ii. Any money market fund having a rating of at least "Aaa" by Moody's or at least "AAA" by S&P;
      iii. Overnight commercial paper having a rating of at least "P-1" by Moody's and "A-1" by S&P;
      iv. Overnight repurchase agreements with U.S. government, agency or dollar cash collateral;
      v. Overnight reverse repurchase agreements with U.S. government, agency or dollar cash collateral; and
      vi. The State Investment Fund or similar short term investment funds.

3. For clarity, Items 1 and 2 do not apply to exchange-traded funds (ETFs), or to over-the-counter derivatives entered into on behalf of SWIB, or a title-holding entity that is wholly-owned by SWIB, by either an external manager or advisor in connection with a real estate separate account.
4. Investments may be made in exchange-traded notes (ETNs) which are traded on exchanges included on an approved-exchange list maintained by the Compliance Division. The Risk and Compliance Divisions shall be notified upon any investment in a new ETN.
5. Investments may be made in put option contracts and call option contracts on securities, futures or an index of a group of securities. Put and call options may be purchased or sold on investments that could be held in the portfolio if the options were exercised.
6. Currency exposure management is permitted (but not required) through the use of exchange-traded currency instruments, and through the use of spot and forward contracts in foreign currencies (including FX Swaps). Direct currency hedging is permitted to directly hedge currency exposure back to the U.S. dollar. Cross-currency exposure management to transfer out of an exposed currency and into a benchmark currency is permitted.

7. Guideline limits and soft parameters for each portfolio will be applied to the aggregate exposures which include both physical and synthetic securities.

8. New derivatives instruments will be reviewed and approved by the Investment Committee before their implementation or use.

9. SWIB shall not enter into new derivatives agreements with new counterparties until the ED/CIO has approved the agreement. Each relevant division head or portfolio manager shall submit to the ED/CIO a written summary of any proposed addition of a relationship that may require evaluation of counterparty credit risks. Such relationship may involve (a) entering into a master netting or trading agreement with a new counterparty, which acts either as a principal or as an agent on behalf of multiple principals, or (b) hiring an external manager to implement a strategy that may require the manager to evaluate and monitor counterparty credit risks on SWIB's behalf (excluding external managers selected by Private Markets and Funds Alpha staff pursuant to their portfolio guidelines). The ED/CIO will review all proposals of such new relationships to determine that (i) the addition of the relationship is consistent with SWIB's investment goals and strategies, (ii) the appropriate loss and drawdown limits for the credit risk associated with the proposed counterparty relationship have been considered, and (iii) appropriate due diligence has been conducted. The relevant division head or portfolio manager ("Initial Division User") shall retain responsibility for monitoring any such approved relationship. If another division expects to use the derivatives agreement for trading strategies after its initial approval, the ED/CIO, Initial Division User and the new division lead shall agree on the strategy for monitoring for the counterparty.

IV. Rebalancing Procedures

1. Mandatory rebalancing is triggered by the procedures in the Board's WRS Investment Policy and the procedures below, as applicable. The Core Fund and Variable Fund asset mixes will be reviewed at least monthly for potential rebalancing.

2. A rebalancing task force will consist of the ED/CIO and the heads of ARA, Global Public Markets Strategies (GPMS) and Private Markets & Funds Alpha (PMFA). The ED/CIO may call a meeting of the rebalancing task force to consider a discretionary rebalancing from time to time. In consultation with the rebalancing task force, and with a majority approval of the task force, a discretionary rebalancing may be initiated pursuant to the plan developed by the ARA Division.

3. Discretionary rebalancing may be used to bring public market asset classes partially or fully back to their strategic target weights, to reduce or use active risk, to otherwise minimize asset allocation drift, or to intentionally overweight or underweight an asset or sub-asset class.

4. In connection with any rebalancing, the ARA Division will develop and implement a plan (a "Rebalancing Plan") to affect the rebalancing. The Rebalancing Plan will include the total amount of each asset class to be bought and sold, the intended market exposures, and the time frame of purchases and sales. The Rebalancing Plan is based on best

estimates of market prices, private market valuations, and benefits cash flows for when the rebalance will take effect. To the extent that the market prices are different at the time of a rebalancing from the anticipated market prices, valuations or cash flows, the Rebalancing Plan may be subsequently adjusted for additional purchases and/or sales to true up the market exposures to the anticipated levels of the originally approved rebalancing without further approval by the rebalancing task force.

5. The ARA Division, under the supervision of the head of ARA, has the discretion to approve intra-month allocation adjustments of unallocated fund-level cash to passive portfolios and to manage asset class mis-alignments. Such adjustments may be, for example, to allocate unallocated fund-level cash arising from a distribution, to raise liquidity to fund private markets capital calls, to adjust for benchmark weight changes, or to otherwise make adjustments during the month as conditions may arise to return the asset allocation to its intended allocation targets consistent with most recently approved Rebalancing Plan. The manner in which intra-month allocation adjustments of unallocated fund-level cash are allocated or cash deficits are funded depends on the source of such unallocated cash or cash deficit and shall follow Guideline 8 below, as applicable. Only passive portfolios may be utilized for allocations or deallocations. Once unallocated fund level cash is allocated to a passive portfolio, investment of such cash shall be made in accordance with the underlying passive portfolio's guidelines. Aggregate daily portfolio allocations or deallocations shall not exceed $250 million unless approved by the ED/CIO.

6. Exchange-traded and OTC options or other derivatives may be purchased or sold in conjunction with managing asset class exposure and rebalancing. The aggregate notional value of the options will be limited to 2% of the market value of the trust fund at the date of purchase. The term of options used for this purpose may not exceed one year.

7. Cleared derivatives traded on a swap execution facility (SEF) may only be traded on or pursuant to the rules of the SEFs of which SWIB is a member or participant.

8. In connection with any rebalancing, the following procedures will be followed with respect to the following asset classes:

    a. The Multi-Asset Strategy Class will rebalance 50% to Public Equities and 50% to Public Fixed Income. Accordingly, in connection with any rebalancing, for any percentage increase of assets in Multi-Asset, there will be a corresponding 50% reduction to Public Equities and a corresponding 50% reduction to Public Fixed Income, and vice versa if the Multi-Asset assets decrease. The rebalancing does not have to be proportional through the sub-asset classes.
    b. The Real Estate Asset Class will rebalance 50% to Public Equities and 50% to Public Fixed Income. Accordingly, in connection with any rebalancing, for any percentage increase in Real Estate there will be a corresponding 50% reduction to Public Equities and a corresponding 50% reduction to Public Fixed Income, and vice versa if the Real Estate assets decrease. The rebalancing does not have to be proportional through the sub-asset classes.

c. The Private Equity Asset Class will rebalance on a 1 for 1 basis to Public Equities. Accordingly, in connection with any rebalancing, for any percentage increase in Private Equity there will be a corresponding 1% reduction to Public Equities. The rebalancing does not have to be proportional through the sub-asset classes.

V. Drawdown Procedures

1. On an annual basis, the Investment Committee shall approve the active risk budget for the next calendar year and the relative drawdown limits per strategy (based on percentage of assets under management (AUM)) for the Core Fund. The relative drawdowns are measured against the benchmark for each strategy on a monthly basis by the Risk Management Division. Relative drawdown limits are intended to protect the Core Fund from large relative drawdowns. Given the active risk that each strategy is expected to take and achieve, the Investment Committee acknowledges that (1) the relative drawdown limits may be reached in any given market environment, and (2) the probability of reaching the drawdown limits is not remote for the levels of active risk approved in the active risk budget.
2. If and when 60% of the relative drawdown limit is reached during the calendar year for any given strategy, the division head, the strategy head, the head of Risk Management, and the ED/CIO will all meet to discuss the relative drawdown limit, attribution, and outlook for the calendar year. The meeting will be documented by email confirmation sent to the Chief Legal Counsel and the head of Compliance.
3. If and when 90% of the relative drawdown limit is reached during the calendar year for any given strategy, the division head, strategy head, the head of Risk Management, and the ED/CIO will all meet to create a plan to address the drawdown for the strategy. The plan may require the strategy to reduce risk, stay the course until a given set of market conditions exist, make certain trades, and/or provide timing for implementation of the plan. A copy of the plan will be presented to the Investment Committee, generally at the next scheduled meeting.

VI. WRS General and Portfolio Guidelines – Internal Management

Each internal portfolio is assigned compulsory investment guidelines. Portfolio managers are generally not allowed to deviate from compulsory guidelines. If a deviation from compulsory guidelines occurs or is expected to occur, the staff member who becomes aware of it must immediately notify the head of the Compliance and Risk Management divisions, ED/CIO, and the division head of the asset class in which the deviation occurred. Upon receiving notice of a deviation or potential deviation, the ED/CIO and relevant division head will either take action to correct the deviation or obtain a waiver approved by the ED/CIO. If the ED/CIO is not available, then the waiver may be granted by any division head (other than the division head of the portfolio that is requesting the waiver) and the Deputy Executive Director, in consultation with the head of Risk Management. All waivers will be reported to the Investment Committee and documented in the Investment Committee's meeting minutes.

All internal portfolios are also assigned "soft risk parameters." Soft risk parameters refer to desired characteristics and/or risk exposures. Portfolio managers are allowed, however, to deviate from soft parameters in pursuit of excess return or efficiency, subject to Investment Committee inquiry, discussion and concurrence of the continued exposure. Soft risk parameters for each portfolio are detailed in *Appendix 2.*

The following general compulsory guidelines ("General Guidelines") are applicable to all internally managed portfolios. Individual portfolio guidelines appear subsequently.

1. All portfolios must be managed in accordance with the fiduciary standards set forth in section 25.15(2) of the Wisconsin Statutes.

2. Credit quality rating requirements refer to an entire rating level, e.g., "A or better" includes "A-" and better ratings. The lower of split ratings is used. Investment grade securities are those rated "BBB-" or better (or the equivalent rating agency rating). Portfolios may invest in unrated securities, provided that the unrated securities have been assigned an internal SWIB rating by portfolio management staff using similar rating methodologies as the rating agencies.

3. Fixed income securities backed by the full faith and credit of the U.S. government will be classified as U.S. government securities for purposes of these guidelines.

4. Any sovereign debt obligation (or the issuer in the event the obligation is unrated) in which SWIB invests must be rated "B3/B-" or above, unless otherwise approved in advance by the Investment Committee based on its guidelines for individual business case determinations.

5. Public equity investments in markets designated as "developed" or "emerging" are investments in entities that are incorporated or organized in countries included in the MSCI World Index or the MSCI Emerging Market Index, respectively. Public fixed income investments in markets designated as "emerging" are investments in the debt of countries (or of companies incorporated or organized in countries) included in the JP Morgan Emerging Markets Diversified Index. Public fixed income investments in the debt of countries (or of companies incorporated or organized in countries) not included in the JP Morgan Emerging Markets Diversified Index will be designated as "developed."

6. The Board approves the benchmarks for the Core Fund and Variable Fund, which are listed in *Appendix 3.* When new benchmarks are approved by the Board or modified by the Board, *Appendix 3* shall be updated without amendment to these IC Guidelines.

7. The Risk Management Division will monitor the risk exposures of all WRS portfolios. The head of Risk Management may recommend modifications to portfolio exposures to manage risk exposures. With the ED/CIO's concurrence, the manager of a portfolio will make changes as recommended by the head of Risk Management. In addition to such recommendations, drawdown control procedures for all active internal WRS portfolios

will be implemented and monitored by the Risk Management Division and adhered to by the portfolios.

8. Portfolios may utilize cash instruments or derivatives in their investment strategy. All investments used will be subjected to the risk analysis and monitoring processes at the portfolio, asset class and fund levels. New derivative and investment instruments will be reviewed with and approved by the Investment Committee prior to implementation.

9. Exposure limits and credit quality exposure limits are to be applied at the time of purchase. Unless otherwise indicated, "value" shall mean market value including un-invested cash.

10. ~~To-be-announced mortgage-backed securities (TBA MBS)~~Covered Agency Transactions as defined in FINRA Rule 4210[2] may be traded only with a counterparty with which SWIB has a current Master Securities Forward Transaction Agreement (MSFTA), and the settlement of any ~~forward TBA contract~~such transaction shall not be more than 90 days from the date of the trade.

    a. The counterparty, or its guarantor, must, on each date on which a transaction is initiated, have a credit rating of not less than "Baa2/BBB" on long-term debt from S&P or Moody's.

    b. If the counterparty is not rated, then its parent must have such a rating and must guarantee the obligations of the counterparty.

    c. If a counterparty or its parent is downgraded to a credit rating below "Baa2/BBB" after the initiation of a trade, then trades may be initiated with that same counterparty only to reduce the existing exposure to that downgraded counterparty.

A. Small Cap Portfolios

The Small Cap Portfolios are invested primarily in publicly traded equity securities that are registered with the Securities and Exchange Commission, including common stocks, preferred stocks, ETFs, American Depository Receipts (ADRs), American Depository Shares (ADSs), convertible bonds, securities issued in initial public offerings, and when-issued securities. The Small Cap Portfolios may also be invested in equity securities that are publicly traded on stock exchanges in other developed countries.

1. When aggregated with other SWIB portfolios, no more than 20% of outstanding shares of any single issuer, excluding shares held in commingled funds and ETFs, may be owned.

2. When aggregated with other SWIB portfolios, no single issuer's equity securities may represent more than 3%, excluding shares held in commingled funds and ETFs, of the total market value of all SWIB equity portfolios.

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[2] "Covered Agency Transactions" include certain to-be-announced (TBA) transactions, specified pooled transactions and collateralized mortgage obligations (CMOs).

3. When aggregated with other SWIB portfolios, securities subject to restrictions on trading pursuant to Rule 144 under the Securities Act of 1933 shall not constitute more than 1% of the market value of all SWIB equity portfolios.

4. Up to 10% of each portfolio's market value may be invested in international and emerging markets companies through common stocks, ADRs, ADSs, or country-specific ETFs. All international and emerging markets stock transactions must be in equity securities that are publicly traded on a stock exchange in a developed country.

5. Portfolios may use exchange-traded futures contracts or ETFs to equitize cash and receivables.

6. Portfolios may sell short any securities that may be purchased under applicable guidelines and may then use the proceeds from the short sale to purchase additional approved securities. The total value of the short sales in a portfolio may not exceed 50% of a portfolio's market value.

7. Except as provided in 4 above, securities must be issued by an entity that is incorporated in the United States; provided that investment is also permitted if the issuer is incorporated in a tax haven outside the United States if 1) the company's headquarters are located in the U.S. or 2) the headquarters are located in Belize, Bahamas, Bermuda, British Virgin Islands, Cayman Islands, Channel Islands, Cook Islands, Isle of Man, Marshall Islands, Panama, Liberia or Netherland Antilles and the primary exchange for the issuer's securities is located in the U.S.

8. The aggregate notional value of put options sold and not covered by portfolio cash is limited to 10% of the market value of the portfolio. The aggregate notional value of call options sold and not covered by the underlying security positions is limited to 10% of the market value of the portfolio.

B. Global Equity ~~Portfolios~~Portfolio

The ~~global sector portfolios are invested primarily~~Global Equity Portfolio is authorized to invest long or short in any publicly traded equity securities, including common stocks, preferred stocks, ~~ADRs, ADSs, ETFs,~~ convertible bonds, ADRs, ADSs, ETFs, securities issued in initial public offerings, and when-issued securities, in each case that are issued and traded in U.S. and non-U.S. developed or emerging markets. ~~Collectively~~For ETFs, the ~~global sector portfolios~~underlying securities shall be equity securities or indices that are ~~referred to~~permitted herein. ~~as the "global sector aggregate portfolio."~~

The portfolio is also authorized to trade derivatives as outlined below.

1. Derivatives on which the pricing reference is equity-based may be used for hedging or speculative purposes. Derivatives on which the pricing reference is non-equity based may be used for hedging purposes but not speculative positioning.

~~1. Investments in companies whose headquarters and/or primary exchange are located in emerging market countries shall not exceed 5% of the global sector aggregate portfolio's market value.~~

2. The ~~global sector aggregate~~ portfolio may ~~own~~hold no more than 10% (long or short) of outstanding shares of a single issuer, excluding shares held in commingled funds and ETFs.

3. The portfolio's aggregate ex-ante tracking error will not exceed 20% as measured by SWIB's standard model used at any given time by SWIB's Risk Management Division. If market conditions (compared to active management actions) cause the portfolio's ex-ante tracking error to exceed this limit, then the portfolio will not be deemed to be out of compliance with these guidelines and this guideline will not be deemed to be violated; except that, if the portfolio's ex-ante tracking error exceeds 20% then the portfolio may not trade or take any other action which is predicted to increase the ex-ante tracking error of the portfolio.

4. For the purpose of managing cash in the portfolio's cash account, the portfolio is authorized to invest long or short in any Investment Committee approved instrument or derivative to create a low-risk return on the cash within the portfolio, subject to the General Guidelines and Derivatives Guidelines contained herein.

~~3. No single issuer's equity securities, excluding shares held in commingled funds and ETFs, as a percentage of the total market value of the global sector aggregate portfolio, may exceed the greater of (i) 4.0% and (ii) the benchmark weight of the issuer plus 2.5%~~.

~~4. Securities subject to restrictions on trading pursuant to Rule 144 of the Securities Act of 1933 shall not constitute more than 1% of the market value of the global sector aggregate portfolio.~~

~~5. Securities offered or sold to U.S. investors pursuant to Regulation D or Rule 144A under the Securities Act of 1933 may be purchased if they are publicly traded on a stock exchange in a developed country.~~

~~6. Sector portfolios may use exchange-traded futures contracts or ETFs to equitize cash and receivables.~~

~~7. Sector portfolios may sell short any securities that may be purchased under applicable guidelines and may then use the proceeds from the short sale to purchase additional approved securities. The total value of the short sales in the global sector aggregate portfolio may not exceed 50% of the portfolio's market value.~~

~~8. The aggregate notional value of put options sold and not covered by portfolio cash is limited to 10% of the market value of the portfolio. The aggregate notional value of call options sold and not covered by the underlying security positions is limited to 10% of the market value of the portfolio.~~

C. Passive Portfolios

The objective of the passive portfolios is to closely track the returns and risk of their respective benchmarks.

1. The universe for inclusion in the portfolio shall be the full respective benchmark for each portfolio. Non-benchmark securities may be held from time-to time as a result of corporate actions, purchases or sales in advance of expected changes to the benchmark. Activity or retention of non-benchmark securities will only occur after the portfolio is entitled to receive the security and if the portfolio manager deems it beneficial to performance and not significantly detrimental to tracking error.

2. Securities offered or sold to U.S. investors pursuant to Regulation D or Rule 144A under the Securities Act of 1933 may be purchased if they are publicly traded on a stock exchange in a developed country.

3. Portfolios may use physical securities or synthetic instruments, including exchange-traded futures contracts, ETFs, swaps, or other Investment Committee-reviewed derivative instruments to equitize cash and receivables, to achieve policy fund level leverage within Trustee-approved limits; for liquidity purposes; to replicate beta for the alpha-beta overlay; or for other passive investment strategies. Passive portfolios used to achieve policy fund level leverage shall be monitored by the ARA Division so that the Policy Leverage does not exceed Board-approved limits.

4. Portfolios may sell short from time to time as a result of corporate actions, benchmark changes or other similar events to more closely, more efficiently and/or more cost effectively track the returns and risk of their respective benchmarks if the portfolio manager deems it beneficial to performance and not significantly detrimental to tracking error. Short positions may not be used to intentionally take active risk. The portfolios may short any securities that may be purchased under Guidelines #1-3 and may then use the proceeds from the short sale to purchase additional approved securities.

D. Investment Grade Credit Portfolio

The Investment Grade Credit Portfolio is primarily invested in publicly traded and Rule 144A investment grade corporate bonds or other fixed income instruments, primarily in the United States and other developed markets. Subject to the limitations set forth below, the portfolio may also invest in bank loans, convertible, and equity securities.

1. Maximum single issuer concentration is limited to 8% of the portfolio’s market value on a net basis for developed markets investment grade issuers and 3% for all other issuers, in each case, excluding Treasuries, Treasury futures and ETFs.

2. Positions may be purchased long and sold short, and the use of leverage will be incorporated in ex-ante risk assessments and active risk/tracking error contributions. The portfolio may take short exposure by shorting individual securities, including cash bonds and equity securities, utilizing single name CDS and CDX index securities, and

shorting ETFs that have been approved by Compliance and included on an approved ETF trading list (including put or call options thereon).

3. The portfolio may use eligible derivative instruments to manage the duration, yield curve exposure, currency, interest rate, equity, and market exposure of the portfolio. Eligible derivatives include (i) credit index swaps (e.g., CDX) and single-name CDS; (ii) futures, forwards and swaps on securities, indices, and interest rates; (iii) options on securities, including equity securities.

4. Effective duration of the portfolio shall remain within two years of the assigned benchmark's duration.

5. Emerging market (EM) debt investment is limited to securities rated "B-" or above and:

   a. EM sovereign debt must be of countries in the JP Morgan Emerging Market Bond Index GlobalDiversified ("JP Morgan EM Bond Index").

   b. EM corporate debt must be ~~of issuers~~denominated in ~~the Bloomberg US Credit Index~~U.S. Dollars.

   c. Gross EM debt shall not exceed 15% of the portfolio's market value on a long or short basis (i.e., long % + short %). EM FX forwards used to hedge currency risk will not be counted against the EM debt exposure threshold.

6. Further limits:

   a. Non-investment grade securities shall not exceed 20% of the portfolio's market value on a gross basis.

   b. Exposure to bank loans, including CLOs, shall not exceed ~~10~~15% of the portfolio's market value on a net basis.

   c. Exposure to convertible securities shall not exceed 10% of the portfolio's market value on a net basis.

   d. Equity exposure shall not exceed 2% of the portfolio's market value on a net basis.

7. Ex-ante tracking error shall not exceed 5% as measured by SWIB's standard model used at any given time by SWIB's Risk Management Division. If market conditions (compared to active management actions) cause the portfolio's ex-ante tracking error to exceed this limit, then the portfolio will not be deemed to be out of compliance with these guidelines and this guideline will not be deemed to be violated; except that, if the portfolio's ex-ante tracking error exceeds 5% then the portfolio may not trade ortake any other action which is predicted to increase the ex-ante tracking error of theportfolio.

8. Gross exposure for the portfolio shall not exceed ~~200~~300% of the portfolio's market value, and net exposure for the portfolio shall not exceed ~~150~~200% of the portfolio's market value, in each case unless approved by the ED/CIO.

E. U.S. TIPS Index Portfolio

The U.S. TIPS Index Portfolio is invested in U.S. Treasury Inflation-Protected Securities (TIPS).

1. Individual securities must be U.S. TIPS which are included in the Barclays U.S. TIPS benchmark.
2. The portfolios option adjusted duration should be +/- 1 year of the benchmark duration.

F. Currency Overlay

To separate the management of currency risk from the risk of asset allocation and security selection, a currency overlay may be established at the fund level for the Core Fund and/or the Variable Fund. The ED/CIO, the head of ARA, and the internal ~~Global Macro~~senior portfolio manager for the Currency Overlay shall set the currency overlay strategy.

1. The amount of the overlay will be expressed in relation to the size of the aggregate non-U.S. market value of the internally managed Global Sector Portfolios and the internally managed MSCI World ex U.S. Index Portfolio. This amount is referred to as the "portfolio reference value." For example, if the Global Sector Portfolios have a non-U.S. market value of $1 billion and the MSCI World ex U.S. Index Portfolio has a market value of $1 billion, then the portfolio reference value is $2 billion.
2. Only the currencies in the MSCI All Country World Index (ACWI) may be used to implement the currency overlay.
3. Currencies may be bought or sold.
4. Positions in any individual non-U.S. currency may be taken equal to +/- 10% of the portfolio reference value for major currencies (Euro, UK Sterling and Japanese Yen) and +/- 5% for all other ACWI currencies. For example, if the portfolio reference value is $2 billion, individual currency positions in major currencies could be taken of +/- $200 million.
5. Up to 25% of the portfolio reference value may be hedged into U.S. dollars.
6. The risk of the currency overlay strategy in aggregate will be limited to 25% of the active risk target for the total trust fund, which is set by the Board.
7. Limits shall be calculated using the notional value of the currency instruments (*i.e.*, forwards and futures) and the portfolio reference value at the time of purchase.

G. Exposure Management Portfolios

Portfolios may be established at the asset class level for multi-asset, public equity and public fixed income asset classes to provide for adjustment and management of the Core Fund and Variable Fund exposures and to utilize or adjust active risk of the Core Fund and Variable Fund. In determining portfolio investments, exposures held in both internally and externally managed portfolios will be considered. These portfolios may also be used to express investment strategies and ideas where the sizing of the investment requires it to be outside of an individual internal portfolio.

Each strategy and/or investment idea expressed in the portfolios shall be approved by any three of the ED/CIO and the heads of ARA, GPMS and PMFA. Portfolio oversight will be the responsibility of the ARA Division, and the Investment Committee will monitor each investment in the portfolios. The Investment Committee shall establish procedures to monitor these portfolios. These portfolios may invest in any instrument approved for the relevant asset class portfolios described elsewhere in these guidelines. The portfolios may use derivative instruments.

Portfolios will not have a separate benchmark or risk target, but will be included within the benchmark and risk parameters for the applicable aggregated asset class. The portfolios may include, for example, investments strategies to adjust aggregate equity beta, the allocations between specific sectors or sub-asset class exposures, currency exposures, volatility exposure, or credit exposure or duration.

H. Multi-Strat Portfolio

1. The Multi-Strat portfolio is authorized to invest in or short any instrument or derivative, subject to guidelines 5 and 6 below and the general guidelines contained herein.
2. Strategies may be managed either by internal investment staff or by an external manager.
3. Leverage and derivatives may be used to implement individual strategies and to adjust the market exposure of the Multi-Strat portfolio.
4. The Multi-Strat portfolio's aggregate ex-ante tracking error will not exceed 12% as measured by SWIB's standard model used at any given time by SWIB's Risk Management Division. If market conditions (compared to active management actions) cause the portfolio's ex-ante tracking error to exceed this limit, then the portfolio will not be deemed to be out of compliance with these guidelines and this guideline will not be deemed to be violated; except that, if the portfolio's ex-ante tracking error exceeds 12% then the portfolio may not trade or take any other action which is predicted to increase the ex-ante tracking error of the portfolio.
5. The ED/CIO and Head of Risk Management must be informed prior to the launch of a new strategy within the Multi-Strat portfolio. New strategies must be reported to the Investment Committee reasonably promptly following the launch.
6. ED/CIO approval, along with notice to the Head of Risk Management, is required prior to the Multi-Strat portfolio investing in an investment instrument or derivative that was previously approved by the Investment Committee for use by other asset class portfolios. Investment in such instruments must be reported reasonably promptly to the Investment Committee. Investment Committee review and approval is required prior to the Multi-Strat portfolio investing in any new investment instruments or derivatives not previously approved by the Investment Committee for any asset class portfolios.

~~I. Global Macro Portfolio~~

~~The Global Macro portfolio implements discretionary or systematic investment strategies by trading in exchange-traded and OTC instruments in interest rates, equity, credit, currency, commodity, and volatility markets.~~

~~1. The Global Macro portfolio is authorized to invest in or short any instrument or derivative, except as set forth in Guideline 6 below, subject to Guideline 5 below.~~

~~2. Strategies may be managed either by internal investment staff or by an external manager.~~

~~3. Leverage and derivatives may be used to implement strategies and to adjust the market exposure of the Global Macro portfolio. The use of leverage will be incorporated in ex-ante risk assessments and active risk contributions.~~

~~4. The portfolio's aggregate ex-ante tracking error will not exceed 20% as measured by SWIB's standard model used at any given time by SWIB's Risk Management Division. If market conditions (compared to active management actions) cause the portfolio's ex-ante tracking error to exceed this limit, then the portfolio will not be deemed to be out of compliance with these guidelines and this guideline will not be deemed to be violated; except that, if the portfolio's ex-ante tracking error exceeds 20% then the portfolio may not trade or take any other action which is predicted to increase the ex-ante tracking error of the portfolio.~~

~~5. ED/CIO approval, along with notice to the Head of Risk Management, is required prior to the portfolio investing in an investment instrument or derivative that was previously approved by the Investment Committee for use by other asset class portfolios. Investment in such instruments must be reported reasonably promptly to the Investment Committee. Investment Committee review and approval is required prior to the portfolio investing in any new investment instruments or derivatives not previously approved by the Investment Committee for any asset class portfolios.~~

~~6. Investment is not permitted in the following tranched structured credit securities: asset-backed securities, collateralized debt obligations, collateralized loan obligations, collateralized mortgage obligations, credit risk transfer securities, private label mortgage-backed securities, commercial mortgage-backed securities, and residential mortgage-backed securities.~~

~~7. Currency forward contracts will be limited to a maximum tenor of one-year.~~

I. ~~J.~~ Long Treasury Portfolio

The Long Treasury portfolio is a long duration, but not long-only, portfolio primarily invested in US Treasury securities, including nominal and inflation-indexed Treasuries and Treasury strips, and other US Government issued debt such as Agency debentures (which include debt, or bonds, issued by a US federal agency or a government-sponsored enterprise (GSE)). It may also invest in other fixed income securities, certain ETFs, and certain derivatives, as outlined below.

1. Securities other than nominal US Treasury securities including principal and interest strips, US Treasury Futures, and ETFs investing primarily in nominal US Treasury securities, but otherwise permitted in these portfolio guidelines, may not exceed 25%, in the aggregate, of the portfolio's market value.

2. Effective duration of the portfolio shall remain within five years of the assigned benchmark's duration.

3. The portfolio may invest long or short in ETFs that invest primarily in US Treasury securities and that have been approved by Compliance and included on an approved trading list (including put or call options thereon).

4. The portfolio's aggregate ex-ante tracking error will not exceed 3% as measured by SWIB's standard model used at any given time by SWIB's Risk Management Division. If market conditions (compared to active management actions) cause the portfolio's ex-ante tracking error to exceed this limit, then the portfolio will not be deemed to be out of compliance with these guidelines and this guideline will not be deemed to be violated; except that, if the portfolio's ex-ante tracking error exceeds 3% then the portfolio may not trade or take any other action which is predicted to increase the ex-ante tracking error of the portfolio.

5. Except for US Treasury securities, ~~US Treasury Futures~~exchange-traded interest rate futures, and ETFs, no single issue may exceed 8% of the portfolio's market value.

6. The portfolio may use repurchase agreements and reverse repurchase agreements for cash management.

7. Derivatives use is permitted as allowed by SWIB's derivative policies for the purposes of duration, interest rate, yield curve, and volatility management. Derivatives use is permitted through the use of (a) exchange-traded and over-the-counter interest rate instruments, including futures and options, (b) interest rate swaps and swaptions, (c) total return swaps (TRS), and (d) other volatility derivatives (including options).

8. All instruments permitted in these guidelines may be traded long or short. Gross exposure for the portfolio shall not exceed ~~200~~300% of the portfolio's market value, and net exposure for the portfolio shall not exceed ~~150~~200% of the portfolio's market value, in each case unless approved by the ED/CIO.

K. Mortgage-Backed Securities Portfolio

The Mortgage-Backed Securities (MBS) portfolio is primarily invested in Agency-issued mortgage-related securities, including MBS pools, collateralized mortgage obligations (CMOs), credit risk transfer (CRT) securities, as well as other securities in the structured products sector such as TBA MBS, commercial mortgage-backed (CMBS), asset-backed (ABS), and private label mortgage-related securities. It may also invest in other fixed income securities, certain ETFs, and certain derivatives as outlined below.

1. Securities other than agency-issued mortgage-related securities (e.g., pools, CMOs, CRTs), mortgage TBAs, and mortgage ETFs, but otherwise permitted in these portfolio guidelines and with effective duration of greater than one year, may not exceed 25%, in the aggregate, of the portfolio's market value.
2. Effective duration of the portfolio shall remain within two years of the assigned benchmark's duration.
3. Private label MBS may not exceed 10% of the portfolio's market value. Private label mortgage securities backed by borrower collateral other than prime may not exceed 5% of the portfolio's market value.
4. The portfolio may invest long or short in ETFs that invest primarily in U.S. MBS and that have been approved by Compliance and included on an approved trading list (including put or call options thereon).
5. The portfolio's aggregate ex-ante tracking error will not exceed 5% as measured by SWIB's standard model used at any given time by SWIB's Risk Management Division. If market conditions (compared to active management actions) cause the portfolio's ex-ante tracking error to exceed this limit, then the portfolio will not be deemed to be out of compliance with these guidelines and this guideline will not be deemed to be violated; except that, if the portfolio's ex-ante tracking error exceeds 5% then the portfolio may not trade or take any other action which is predicted to increase the ex-ante tracking error of the portfolio.
6. Except for TBA MBS, US Treasuries and ETFs, no single issue may exceed 5% of the portfolio's market value. No single BBB-rated issue may exceed 2% of the portfolio's market value. The average rating of securities covered by these limits will be "Baa2/BBB" or better. No single issue rated below investment grade may exceed 1% of the portfolio's market value. Each tranche of a securitized product is considered a separate issue. Total exposure to issues rated below investment grade may not exceed 20% of the portfolio's market value, in the aggregate.
7. Fixed income securities with an effective duration of one year or less ~~(i) may not, in the aggregate, exceed 25% of the portfolio's market value, and (ii)~~ will have an average credit rating of "A" or better. The portfolio may also use repurchase agreements and reverse repurchase agreements for cash management.
8. Derivatives use is permitted for the purposes of duration, interest rate, yield curve, mortgage credit, and volatility management. Derivatives use is permitted through the use of (a) exchange-traded interest rate instruments, including futures and options, (b) interest rate swaps and swaptions, (c) total return swaps (TRS), (d) MBS

options, (~~d~~e) other volatility derivatives (including options), and (~~e~~f) credit index swaps (e.g., CMBX, CDX).

9. All instruments permitted in these guidelines may be traded long or short. Excluding the TBA Strategy, gross exposure for the portfolio shall not exceed ~~200~~300% of the portfolio's market value, and net exposure for the portfolio shall not exceed ~~150~~200% of the portfolio's market value, in each case unless approved by the ED/CIO.

10. CLOs collateralized by corporate bank loans may not exceed ~~3~~15% of the portfolio's market value.

L. High-Yield Bond Portfolio

The High-Yield Bond Portfolio is eligible to invest in any instruments included in the assigned benchmark — primarily U.S. dollar denominated publicly-traded and Rule 144A high-yield corporate bonds or other fixed income instruments rated between BB+/Ba1 and B-/B3. Subject to the limitations set forth below, the portfolio may also invest in non-U.S. dollar denominated bonds of issuers located outside of the United States, as well as convertible, preferred securities and equity securities.

1. The portfolio shall maintain at minimum a weighted average rating of B-. Subject to the forgoing, the portfolio may hold fixed income instruments rated below B-/B3~~ as well as unrated securities, provided the unrated securities have been assigned an internal SWIB rating by portfolio management staff using similar rating methodologies as the rating agencies~~.

2. Effective duration of the portfolio shall remain within +/- five years of the assigned benchmark's effective duration.

3. Positions may be purchased long and sold short, and the use of leverage will be incorporated in ex-ante risk assessments and active risk/tracking error contributions. The portfolio may take short exposure by shorting individual securities, cash bonds, buying single name CDS, shorting the CDX index, shorting high-yield and equity ETFs that have been approved by Compliance and included on an approved ETF trading list (including put or call options thereon), as well as shorting the underlying equity of a leveraged issuer.

4. Instruments not included in the benchmark, but otherwise permitted in these portfolio guidelines, may not exceed 25% of the portfolio's market value on a long or short basis (i.e., long % + short %). For the avoidance of doubt, any instrument that is subsequently removed from the portfolio's benchmark due solely to the instrument's maturity falling below the benchmark's stated thresholds shall not be deemed to be out of benchmark for purposes of the 25% limitation described in this Guideline #4.

5. Maximum single issuer concentration is limited to 5%, excluding Treasuries, Treasury futures and holdings of ETFs, of the portfolio's market value on a net basis.

6. Gross exposure to non-U.S. Dollar denominated instruments shall not exceed 10% of the portfolio's market value on a long or short basis (i.e., long % + short %).

7. Gross exposure to emerging market corporate debt is limited to (a) securities that are rated "B-/B3" or above and (b) issuers incorporated or organized in countries included in the JP Morgan Emerging Markets Diversified Index, and in aggregate shall not exceed 5% of the portfolio's market value on a net basis.

8. Exposure to any single industry sector shall remain within 20% of the assigned benchmark's industry sector weighting on a net basis.

9. Exposure to high-yield bank loans shall not exceed 10% of the portfolio's market value on a net basis.

10. Ex-ante tracking error shall not exceed 5% as measured by SWIB's standard model used at any given time by SWIB's Risk Management Division. If market conditions (compared to active management actions) cause the portfolio's ex-ante tracking error to exceed this limit, then the portfolio will not be deemed to be out of compliance with these guidelines and this guideline will not be deemed to be violated; except that, if the portfolio's ex-ante tracking error exceeds 5% then the portfolio may not trade or take any other action which is predicted to increase the ex-ante tracking error of the portfolio.

11. The portfolio may use eligible derivative instruments to manage the duration, yield curve exposure, currency, interest rate, and market exposure of the portfolio. Eligible derivatives include (i) CDS (as described in more detail under Guideline #3 above); (ii) futures contracts on securities, indices, and interest rates; (iii) forward contracts for securities, indices, and interest rates; (iv) swap contracts for securities, indices, and interest rates; (v) options on high yield and equity ETFs (as described in more detail under Guideline #3 above); and (vi) options on the underlying equity of a leveraged issuer.

12. Gross exposure for the portfolio shall not exceed ~~200~~300% of the portfolio's market value, and net exposure for the portfolio shall not exceed ~~150~~200% of the portfolio's market value, in each case unless approved by the ED/CIO.

M. Leveraged Loan Portfolio

The Leveraged Loan Portfolio is eligible to invest in any instruments included in the assigned benchmark — primarily U.S. dollar denominated publicly-traded and senior secured syndicated leveraged loans. Subject to the limitations set forth below, the portfolio may also invest in non-U.S. dollar denominated loans and/or bonds of issuers located outside of the United States, as well as collateralized loan obligations (CLOs), derivatives, convertible, preferred securities and equity securities.

1. No less than 75% of the portfolio's market value can be invested in single-name first-lien bank loans, total return swaps on leveraged loans, and/or ETFs with a diversified portfolio of first-lien bank loans, in aggregate.

2. The portfolio shall maintain at minimum a weighted average rating of B. Subject to the foregoing, the portfolio may hold fixed income instruments rated below B-/B3 as well as unrated securities, provided the unrated securities have been assigned an internal SWIB rating by portfolio management staff using similar rating methodologies as the rating agencies.
3. Positions may be purchased long and sold short, and the use of leverage will be incorporated in ex-ante risk assessments and active risk/tracking error contributions. The portfolio may take short exposure by shorting individual securities, including cash bonds and equity securities, utilizing single name CDS and CDX index securities, and shorting ETFs that have been approved by Compliance and included on an approved ETF trading list (including put or call options thereon).
4. Instruments not included in the benchmark, but otherwise permitted in these portfolio guidelines, may not exceed 50% of the portfolio's market value on a long or short basis (i.e., long % + short %).
5. Maximum single issuer concentration is limited to 5%, excluding Treasuries, Treasury futures and holdings of ETFs, of the portfolio's market value on a net basis.
6. Gross exposure to non-U.S. Dollar denominated instruments shall not exceed 10% in the aggregate of the portfolio's market value on a long or short basis (i.e., long % + short %).
7. Aggregate exposure to second-lien loan instruments is limited to 15% of the portfolio's market value on a long or short basis (i.e., long % + short %), and maximum exposure to a single second-lien loan instrument is limited to 2.5% of the portfolio's market value on a long or short basis (i.e., long % + short %).
8. Ex-ante tracking error shall not exceed 5% as measured by SWIB's standard model used at any given time by SWIB's Risk Management Division. If market conditions (compared to active management actions) cause the portfolio's ex-ante tracking error to exceed this limit, then the portfolio will not be deemed to be out of compliance with these guidelines and this guideline will not be deemed to be violated; except that, if the portfolio's ex-ante tracking error exceeds 5% then the portfolio may not trade or take any other action which is predicted to increase the ex-ante tracking error of the portfolio.
9. The portfolio may use eligible derivative instruments to manage the yield curve, currency, interest rate, and market exposures of the portfolio. Eligible derivatives include (i) CDS (as described in more detail under Guideline #3 above); (ii) futures contracts on securities, indices, and interest rates; (iii) forward contracts for securities, indices, and interest rates; (iv) swap contracts for securities, indices, loans, and interest rates; (v) options on leveraged loans, indices, and/or equity ETFs (as described in more detail under Guideline #3 above); and (vi) options on the underlying equity of a leveraged issuer.
10. Gross exposure for the portfolio shall not exceed ~~200~~300% of the portfolio's market value, and net exposure for the portfolio shall not exceed ~~150~~200% of the portfolio's market value, in each case unless approved by the ED/CIO.

N. Short Term Credit Portfolio

The Short-Term Credit Portfolio is an investment vehicle of cash and short-term investments of the WRS designed to achieve a return equal to a bank yield index + 30 bps. Its investment objectives are: 1) Safety of principal; 2) Return Objective; and 3) Liquidity.

Portfolio Allocation

(Percent of Portfolio at Par Value)

Treasuries, Agencies, and FDIC Insured Bank Deposits	0-100%
Repurchase Agreements	0-100%
Commercial Paper	0-100%
Corporate Notes	0-100%
Certificates of Deposit/Time Deposits	0-50%
Bankers' Acceptances	0-50%
Yankee/Euro Certificates of Deposit/Time Deposits (U.S. Dollars)	0-50%

Maturity Guidelines

(Maximum)

Consistent with the portfolio purpose and objectives, the portfolio weighted average maturity will not exceed one year (the weighted average maturity of floating rate securities is based on interest rate reset dates).

Repurchase Agreements	1 year
Reverse Repurchase Agreements	1 year
U.S. Treasuries and Agencies	5 years
Commercial Paper/Bankers' Acceptances	1 year
Corporate Notes – Fixed Rate	3.1 years
Corporate Notes – Floating Rate	5.1 years
Certificates of Deposit/Time Deposits	5 years
Yankee/Euro Certificates of Deposit/Time Deposits	5 years

Issuer Exposure

(Percent of Portfolio at Par Value)

The maximum exposure for each issuer/guarantor/counterparty shall be in the aggregate as follows:

U.S. Treasury Bills and U.S. Agency Discount Notes	No limit
Repurchase Agreements (Gov't/Agency Collateral)	25%
Repurchase Agreements (Other Collateral)	5%
Commercial Paper and Corporate Notes	5%
Certificates of Deposit/Time Deposits	5%
Bankers' Acceptances	5%
Yankee/Euro Certificates of Deposit/Time Deposits (U.S. Dollars)	5%
Wisconsin CD Program – individual bank (unless a higher limit from another category applies.)	$20MM or 3% of bank assets, whichever is less
Bank Deposits	Up to the amount guaranteed by the FDIC or the amount allowable for a bank instrument, whichever is higher

CREDIT QUALITY

The minimum rating of an issuer/counterparty shall be the lowest in the event of a split rating and shall be as follows:

U.S. Treasury Bills and U.S. Agency Discount Notes	No minimum
Repurchase Agreements	BBB
Commercial Paper	A-2/P-2
Unrated Wisconsin Company Commercial Paper (maximum maturity of 90 days and percentage of the portfolio in unrated CP cannot exceed 15%)	Unrated
Corporate Notes, Bankers' Acceptances, Certificates of Deposit/ Time Deposit, Bank Deposits and Yankee/Euro Certificates of Deposit/Time Deposits (U.S. Dollars) greater than 1 year	A
Corporate Notes, Bankers' Acceptances, Certificates of Deposit/ Time Deposit, Bank Deposits and Yankee/Euro Certificates of	BBB

Deposits (U.S. Dollars) less than 1 year
(the percentage of the portfolio in BBB cannot exceed 15%).

Wisconsin CD Program – individual bank	Unrated

O. General Guidelines specific for Private Markets and Funds Alpha Portfolios

1. The portfolio manager shall be responsible for notifying the ED/CIO of any referrals or significant contacts by or on behalf of SWIB Trustees regarding consideration of an investment opportunity.

2. The Private Markets & Funds Alpha (PMFA) staff shall report to the Trustees all portfolio commitments to non-public investments.

3. Each portfolio manager shall obtain written confirmation from legal counsel (which may be external legal counsel) that documentation has been satisfactorily completed prior to closing of any investment in his or her portfolio that involves negotiated SWIB documentation.

4. Each portfolio manager shall submit to the head of PMFA a written summary of any proposed investment. The head of PMFA will review all such investments to determine that a) the investment falls within the portfolio's investment guidelines, including limits on invested capital, b) the investment is consistent with the portfolio's established strategy, and c) the appropriate due diligence standards are being applied. No such investment may be closed without approval of the head of PMFA or ED/CIO depending upon the nature and amount of the investment as required in the relevant portfolio guidelines. The portfolio manager shall retain responsibility for each investment decision. External managers with delegated investment discretion operate under separate authority. For purposes of this paragraph, "investments" does not include the individual properties within a Real Estate Equity Portfolio separate account tranche, but does include the tranche that holds such properties.

5. Dollar limitations for commitments to funds or other investments do not apply to incidental and customary contractual reinvestment, indemnity, reserve or similar obligations incorporated into the terms of an investment, provided such obligations are not expected to be material.

6. Private equity and venture capital investments in markets designated as "developed" or "emerging" are investments in countries included in the MSCI World Index or the MSCI Emerging Market Index, respectively. Real estate investments in markets designated as "developed" or "emerging" are investments in properties in countries included in the EPRA/NAREIT Developed Index and the EPRA/NAREIT Emerging Market Index, respectively.

7. Funds or commingled investments shall be considered U.S., non-U.S., "developed" or "emerging" based on their primary strategy and not on a look-through basis to the underlying investments.

8. Exposure limits and credit quality exposure limits are to be applied at the time of purchase. The term "exposure" is defined as the net asset value plus unfunded commitments. "Allocations" are calculated as the current net asset value of any existing investment(s) plus the intended subscription.

9. A "follow-on fund" is generally defined as an investment or an investment vehicle that has the same sponsor or manager and is either parallel to, or has a substantially similar investment strategy as, a fund in which SWIB is or has been an investor.

10. SWIB staff may determine to engage a consultant to review prospective investments, perform operational due diligence on prospective investments, or otherwise assist staff in the evaluation of investment opportunities and/or managers.

P. Private Debt Portfolio

The overall objective of the Private Debt Portfolio (the "Private Debt Portfolio" includes both the Wisconsin Private Debt Portfolio and the Non-Wisconsin Private Debt Portfolio) is to invest funds of the Core Fund in market rate fixed income instruments consistent with SWIB's fiduciary responsibilities that are primarily private loans negotiated by SWIB directly or as part of an investor group that includes banks or other institutional investors. The two portfolios are invested as follows:

- Wisconsin Private Debt Portfolio – This portfolio's investments will consist of loans or fixed income securities issued by companies or entities that are headquartered in Wisconsin, have existing operations in Wisconsin, or intend to apply the proceeds to new business operations in Wisconsin which contribute to the Wisconsin economy.
- Non-Wisconsin Private Debt Portfolio – This portfolio can invest in loans or fixed income securities issued by companies or entities located in or doing business in the United States.

The Private Debt Portfolio may also include securities sold to SWIB pursuant to Rule 144A or in the public fixed income markets. Investments may be made in fixed income instruments and in instruments with both fixed income and equity features.

1. Investments may carry a rating from a national rating agency, the National Association of Insurance Commissioners (NAIC) or SWIB. Notwithstanding the provisions of the General Guidelines above, the Portfolio Manager may make investments that carry a "BBB" or better rating from a national rating agency or the NAIC, provided that if the investment carries only a SWIB rating, it shall be approved by the head of PMFA, regardless of size.
2. Investments may be made in below investment grade instruments provided that such investments do not in the aggregate constitute more than 25% of the Private Debt Portfolio's par value. Any investment below investment grade requires approval from the head of PMFA.

3. The Private Debt Portfolio's aggregate portfolio issuer limits shall be scaled by quality and a purchase may not cause the Private Debt Portfolio's exposure to a borrower or issuer to exceed the following limits (at par value):

Rating	**Maximum Position**
U.S. Gov't/Agency	No Limit
"AA" or higher	$100 MILLION
"A"	$75 MILLION
"BBB"	$50 MILLION
"BB" or less	$25 MILLION

4. The Private Debt Portfolio shall maintain at minimum a weighted average rating of "BBB", where "AAA"=4, "AA"=3, "A"=2, "BBB"=1, and "BB" or less =0.
5. Other guideline limitations notwithstanding, portfolio managers or other staff authorized by the head of PMFA may modify or waive terms of investments in the portfolio and generally take any and all other actions that are necessary and reasonable to protect, maintain or enhance the value of SWIB's position in the investments.

Q. Venture Capital Portfolio

The SWIB Venture Capital Portfolio (the "Venture Capital Portfolio" includes both the Wisconsin Venture Capital Portfolio and the Non-Wisconsin Venture Capital Portfolio) consists of venture capital or venture capital-related investments and invests as follows:

- The Non-Wisconsin Venture Capital Portfolio shall make venture capital investments on a global basis in limited partnership or other fund vehicles, through strategic partnerships, or as co-investments in venture-backed companies or publicly traded companies that were venture backed.
- The Wisconsin Venture Capital Portfolio shall make venture capital investments in limited partnership or other fund vehicles or strategic partnerships that are either located in Wisconsin and/or which target Wisconsin as a primary market or as co-investments in venture-backed companies or publicly traded companies that were venture backed that are located or have operations in Wisconsin.

1. Any other guidelines notwithstanding, the Venture Capital Portfolio commitments are subject to the following approvals:

Approval By:	Head of PMFA	ED/CIO

New Manager		
• Venture Capital Funds	Up to $60 million or less	More than $60 million
• Venture Capital Co-Investments	Up to $20 million or less	More than $20 million
Follow-on Commitments		
• Venture Capital Funds	Up to $75 million	More than $75 million
• Venture Capital Co-Investments (excluding funds of one)	Up to $25 million	More than $25 million
SWIB ownership equal to or greater than 50% of an individual fund (excluding funds of one and any fund/vehicle through which a co-investment is made)	ED/CIO, provided that notice shall be given to the ED/CIO if ownership of an individual fund (excluding a fund/vehicle through which a co-investment is made) is equal to or greater than 33 1/3%	

2. No more than 45% of the Venture Capital Portfolio's exposure may be invested outside of the U.S., without the approval of the ED/CIO. No more than 20% of the Venture Capital Portfolio's exposure may be invested in emerging markets. No more than 5% of the Venture Capital Portfolio's exposure may be invested in companies located in emerging markets.

3. Venture capital investments may be made through funds, strategic partnerships, or co-investments. Venture capital co-investments (excluding funds of one) must be made in one of the following ways:

   (1) alongside a fund with the same sponsor or manager as a fund in which SWIB is or has been an investor,

   (2) alongside a fund with the same sponsor or manager as a fund on which SWIB is conducting due diligence and is actively evaluating for a prospective commitment, or

   (3) as approved by the ED/CIO.

4. From time to time, SWIB may consider formation of fund investments where it may participate both as a general partner and as limited partner.

5. Venture capital co-investments made within the Wisconsin Venture Capital Portfolio are limited to companies with their headquarters or primary operations in Wisconsin. Co-investments in the Non-Wisconsin Venture Capital Portfolio may not make up more than 15% of the Venture Capital Portfolio's exposure.

6. Neither the aggregate exposure (including co-investments) to any fund manager or sponsor, nor the aggregate amount of investments in any company, may exceed 20% of the Venture Capital Portfolio's exposure without approval of the ED/CIO.

7. No single co-investment (excluding funds of one) shall exceed 10% of the Venture Capital Portfolio's exposure.

8. The Venture Capital Portfolio may make co-investments in public company securities through private placements, including PIPEs, or other offerings. Co-investments in public company securities shall not exceed 10% of the Venture Capital Portfolio's exposure. For purposes of this guideline, public company securities received via a distribution are not counted and are expected to be sold as soon as reasonably practicable.

9. Subject to the approval thresholds and the restrictions above, the Venture Capital Portfolio Manager or other staff authorized by the head of PMFA may modify or waive terms of investments in the portfolio and generally take any and all other actions that are necessary and reasonable to protect, maintain or enhance the value of SWIB's position in the investments.

R. Private Equity Portfolio

The Private Equity Portfolio consists of private equity or private equity-related investments, made on a global basis, in limited partnership or other fund vehicles, strategic partnerships, and co-investments in operating or holding companies. Investment guidelines and soft parameters shall be applied to the aggregate composition of the Private Equity Portfolio (including the Legacy, Private Equity Co-Investment, Current Return and Current Return Co-Investment Portfolios), unless otherwise stated.

1. Any other guidelines notwithstanding, all portfolio commitments are subject to the following approvals:

	Head of PMFA	ED/CIO
New Manager		
• Funds or Strategic Partnerships	$150 million or less	Over $150 million
• Co-Investments	$50 million or less	Over $50 million
Follow-on Commitments		
• Funds or Strategic Partnerships	$300 million or less	Over $300 million
• Co-Investments	$100 million or less	Over $100 million

SWIB ownership equal to or greater than 50% of an individual fund (excluding a fund/vehicle through which a co-investment is made)	ED/CIO, provided that notice shall be given to the ED/CIO if ownership of an individual fund (excluding a fund/vehicle through which a co-investment is made) is equal to or greater than 33 1/3%

2. The Private Equity Portfolio shall not include investments in venture capital funds.

3. Investments may be made through funds, strategic partnerships, or co-investments. Co-investments must be made in one of the following ways:

   (1) alongside a fund with the same sponsor or manager as a fund in which SWIB is or has been an investor,

   (2) alongside a fund with the same sponsor or manager as a fund on which SWIB is conducting due diligence and is actively evaluating for a prospective commitment, or

   (3) as approved by the ED/CIO.

4. Neither the aggregate exposure (including co-investments) to any fund manager or sponsor, nor the aggregate amount of investments in any company, may exceed 10% of the total Private Equity Portfolio's exposure without approval of the ED/CIO.

5. No more than 45% of the Private Equity Portfolio's exposure may be invested outside of the U.S., without the approval of the ED/CIO. No more than 20% of the Private Equity Portfolio may be invested in emerging markets.

6. No more than 45% of the Private Equity Co-Investment Portfolio's exposure may be invested outside of the U.S., without the approval of the ED/CIO. No more than 20% of the Private Equity Co-Investment Portfolio's exposure may be invested in companies located in emerging markets.

7. The Private Equity Co-Investment Portfolio may make co-investments in public company securities through private placements, including PIPEs, or other offerings. Co-investments in public company securities shall not exceed 10% of the Private Equity Co-Investment Portfolio's exposure. For purposes of this guideline, public company securities received via a distribution are not counted and are expected to be sold as soon as reasonably practicable.

8. Other guideline limitations notwithstanding, portfolio managers or other staff authorized by the head of PMFA may modify or waive terms of investments in the portfolio and generally take any and all other actions that are necessary and reasonable to protect, maintain or enhance the value of SWIB's position in the investments.

S. Real Estate Equity Portfolio Guidelines

The Real Estate Equity Portfolio contains investments in a broad range of real estate and real estate-related assets, including equity and debt investments, either solely, or through investment vehicles and structures such as public or private Real Estate Investment Trusts (REITs), public or private real estate company securities, limited liability corporations, limited partnerships, joint ventures, separate accounts or co-investment vehicles. Investment guidelines and soft parameters for Real Estate shall be applied, on an invested basis, to the aggregate composition of the Real Estate Equity Portfolio (except that all REIT portfolios shall be included in the aggregate as Core holdings).

All portfolio commitments are subject to the following approvals:

	Head of PMFA	ED/CIO
Commingled Fund		
• New Fund	$150 million or less	Over $150 million
• Follow-on Fund	$300 million or less	Over $300 million
Core - Separate Account*	$300 million or less	Over $300 million
Non-Core – Separate Account*	$200 million or less	Over $200 million

*With respect to a separate account tranche, approval is required for the tranche, but not for individual investments within the tranche.

1. Aggregate exposure (including co-investments) to any commingled fund manager or sponsor may not exceed 20% of the Real Estate Equity Portfolio's exposure without approval of the ED/CIO. This does not apply to real estate investments for which SWIB has sole discretion to select, retain, and terminate manager(s) and/or advisor(s) without cause.
2. Aggregate direct public REIT and real estate company stock holdings (excluding underlying commingled fund holdings and externally managed REIT Portfolios) may not exceed 15% of the Real Estate Equity Portfolio's exposure and portfolio investments in any one public REIT or company may not exceed 3% of the Real Estate Equity Portfolio's exposure. SWIB's direct ownership position in any public REIT or company may not exceed 20% of outstanding voting equity, without ED/CIO approval. Any externally managed REIT portfolio(s) will be managed under separate authority, with guidelines set out in the management agreement(s) between SWIB and the selected manager(s).
3. No more than 45% of the Real Estate Equity Portfolio's exposure may be invested outside the U.S., without the approval of the ED/CIO. No more than 20% of the Real Estate Equity Portfolio's exposure may be invested in emerging markets, and no more than 10% of the Real Estate Equity Portfolio's exposure may be invested in separate accounts invested in emerging markets.
4. Other guideline limitations notwithstanding, the portfolio manager or other staff authorized by the head of PMFA may: modify or waive terms of investments in the portfolio, including without limitation mortgages and leases on real estate in the

portfolio; enter into new mortgages and leases; execute deeds and bills of sale; make expenditures for maintenance and improvements; grant easements; hire consultants, service providers, real estate advisors and property managers; and generally take any and all other actions that are necessary and reasonable to protect, maintain or enhance investment value of SWIB's position in the investments.

5. Prior to funding a direct investment (including a property within a separate account tranche) where real property is a material component, the property shall be evaluated for the presence of environmental and code compliance issues. If environmental issues that require action by governmental authorities exist, then funding shall not occur until an adequate remediation program is in place. If code compliance issues exist, then an adequate plan to bring the property into compliance shall be in place.

6. SWIB may not initiate improvement or development of real property owned or controlled by SWIB without making provisions for compliance with applicable Federal, state and local codes and ordinances.

T. Current Return Portfolio

The Current Return Portfolio consists of current return or certain equity-related investments, made on a global basis, in limited partnership or other fund vehicles, strategic partnerships, and co-investments in operating or holding companies. Investments may be made in fixed income instruments and in instruments with both current pay and equity features. Investment guidelines and soft parameters shall be applied to the aggregate composition of the Private Equity Portfolio (including the Legacy, Private Equity Co-Investment, Current Return and Current Return Co-Investment Portfolios), unless otherwise stated.

1. Any other guidelines notwithstanding, all portfolio commitments are subject to the following approvals:

	Head of PMFA	ED/CIO
New Manager		
• Funds or Strategic Partnerships	$150 million or less	Over $150 million
• Co-Investments	$50 million or less	Over $50 million
Follow-on Commitments		
• Funds or Strategic Partnerships	$300 million or less	Over $300 million
• Co-Investments	$100 million or less	Over $100 million
SWIB ownership equal to or greater than 50% of an individual fund (excluding a fund/vehicle through which a co-investment is made)	ED/CIO, provided that notice shall be given to the ED/CIO if ownership of an individual fund (excluding a fund/vehicle through which a co-investment is made) is equal to or greater than 33 1/3%	

2. Investments may be made through funds, strategic partnerships, or co-investments. Co-investments must be made in one of the following ways:

   (1) alongside a fund with the same sponsor or manager as a fund in which SWIB is or has been an investor;

   (2) alongside a fund with the same sponsor or manager as a fund on which SWIB is conducting due diligence and is actively evaluating for a prospective commitment; or

   (3) as approved by the ED/CIO.

3. Neither the aggregate exposure (including co-investments) to any fund manager or sponsor, nor the aggregate amount of investments in any company, may exceed 10% of the total Private Equity Portfolio's exposure without approval of the ED/CIO.

4. No more than 45% of the Current Return Portfolio's exposure may be invested outside of the U.S., without the approval of the ED/CIO. No more than 20% of the Current Return Portfolio may be invested in emerging markets.

5. No more than 45% of the Current Return Co-Investment Portfolio's exposure may be invested outside of the U.S., without the approval of the ED/CIO. No more than 20% of the Current Return Co-Investment Portfolio's exposure may be invested in companies located in emerging markets.

6. The Current Return Co-Investment Portfolio may make co-investments in public company securities through private placements or other offerings. Co-investments in public company securities shall not exceed 10% of the Current Return Co-Investment Portfolio's exposure. For purposes of this guideline, public company securities received via a distribution are not counted and are expected to be sold as soon as reasonably practicable.

7. Other guideline limitations notwithstanding, portfolio managers or other staff authorized by the head of PMFA may modify or waive terms of investments in the portfolio and generally take any and all other actions that are necessary and reasonable to protect, maintain or enhance the value of SWIB's position in the investments.

U. Hedge Fund Portfolio

The Hedge Fund Portfolio ("HF Portfolio") will be comprised primarily of direct investments in hedge funds and is intended to generate a low-beta, alpha-oriented return stream.

1. The HF Portfolio will be comprised of the following investment vehicles:

   a. *Direct Investments or Fund-of-Funds*: SWIB intends for its portfolio to be comprised primarily of direct investments in hedge funds rather than fund-of-funds vehicles that use an intermediary investment advisor(s) to select and allocate to hedge funds through a commingled fund, but SWIB may make investments in fund-of-fund vehicles, as may be deemed appropriate by Funds Alpha staff and otherwise approved hereunder.

b. *Hedge Funds or Separately Managed Accounts* ("SMAs"): Investments can be made in limited liability partnerships with other investors or, in some cases depending upon the manager and size of investment, in separately managed accounts. SWIB expects its investments will be in limited liability vehicles rather than SMAs, but may make use of SMAs if it is in the best interest of SWIB to do so.

c. *Special Opportunity Investments:* SWIB may invest a portion of its portfolio in special opportunity investments, which may include: interests in the equity or revenues of hedge fund managers, co-invest, or external manager "best ideas" opportunities. Special Opportunity Investments will be capped at 20% of the market value of the total HF Portfolio.

2. Hedge Fund Investment Strategies:

a. *Event-Driven* – investments up (debt or credit) and down (equity) the corporate capital structure where an expectation exists for realized profits over a short to medium time frame as a result of a known catalyst such as a merger, spinoff, or restructuring.

b. *Long-Short Equity* – long and short investments in publicly traded stocks.

c. *Tactical Trading* – global investments in indexes, commodities, interest rates, and currencies and, in each case, their derivatives as a result of relative value or directional forecasts from a systematic or discretionary approach.

d. *Relative Value* – strategies that seek to take advantage of price differentials by buying and selling different yet related securities. Relative value strategies include fixed income arbitrage, insurance linked, long/short credit, quantitative strategies, structured credit, and volatility-related investments.

e. *Multistrategy* – funds that invest across multiple asset classes, typically (but not always) with multiple portfolio managers. Most multistrategy funds diversify across three or more underlying strategies.

The HF Portfolio has the following target weightings and ranges to the individual hedge fund strategies:

	Target Allocation	Target Maximum
Relative Value	20%	40%
Event-Driven	15%	30%
Long-Short Equity	20%	30%
Tactical Trading	20%	40%
Multistrategy	20%	40%
Special Opportunity Investments	5%	20%

		100%	

3. Approvals: HF Portfolio allocations are subject to the following approvals:

	Head of PMFA	ED/CIO
New Funds		
• Core	Up to $300 million	More than $300 million
• Special Opp/ Co-invest	Up to $50 million	More than $50 million
Additional Subscriptions to Existing Funds and/or Follow-On Funds		
• Core	Up to $400 million ~~aggregate invested~~aggregated	More than $400 million
• Special Opp/ Co-invest	Up to $100 million ~~aggregate invested~~aggregated	More than $100 million
SWIB ownership equal to or greater than 50% of an individual fund, calculated at the master fund level (excluding funds of one and a fund/vehicle through which a co-investment is made)	ED/CIO, provided that notice shall be given to the ED/CIO if ownership of an individual fund (excluding funds of one and a fund/vehicle through which a co-investment is made) is equal to or greater than 33 1/3%	

4. The aggregate exposure to any hedge fund manager or sponsor (including co-investments) may not exceed 15% of the total HF Portfolio's exposure without approval of the ED/CIO.

5. Other guideline limitations notwithstanding, portfolio managers or other staff authorized by the head of PMFA may modify or waive terms of investments in the portfolio and generally take any and all other actions that are necessary and reasonable to protect, maintain, or enhance the value of SWIB's position in the investments.

6. All redemptions, terminations or reductions of capital will be at the discretion of the Funds Alpha Manager and the head of PMFA.

V. Beta One Portfolio

The Beta One Portfolio will be comprised primarily of direct investments in strategies of external managers that are intended to generate both (1) a beta or SWIB policy benchmark return and (2) an active alpha return stream above the benchmark. These managers are referred to as Beta One External Managers due to their dual mandate to manage both a Core Fund and Variable Fund asset allocation benchmark and a tracking error around the given benchmark. The manager is expected to deliver the total return of the benchmark (or beta of one), plus an excess return (alpha) over the benchmark. This is distinctive compared to SWIB's external hedge fund portfolio, which is designed to deliver only an excess return or alpha. This section does not govern passive external managers which the Asset and Risk Allocation Division oversees and monitors.

1. Investments in Beta One External Managers will be comprised of the following investment vehicles:
    a. *Separately Managed Accounts* ("SMAs"): SWIB intends for its portfolio to be comprised primarily of direct investments in various strategies via SMAs, the assets of which would reside at SWIB's custodial bank.
    b. *Commingled Investments or Fund Investments*: Investments can be made in commingled funds and/or limited liability partnerships with other investors or in a Fund-of-One structure where SWIB is the sole investor.

2. Investment Strategies and Broad Guidelines for Beta One External Managers:
    a. *Equities* – strategies will be comprised of various fundamental, quantitative and other approaches intended to produce an active return above the respective benchmarks. Strategies will be invested in traditional long only portfolios, active extension formats (i.e. 130/30, 150/50) and other public equity securities approaches across various styles, geographies and market cap weights. A limited use of shorting (up to 50%) may be used in the active extension format in non-SMAs.
    b. *Fixed Income* – strategies will be comprised of various fundamental, quantitative, and other approaches intended to produce an active return above the respective benchmarks. Strategies will primarily be invested in traditional long only portfolios across the credit quality spectrum, varying geographies, including emerging and frontier market debt, high yield and structured securities. Derivatives may be used primarily for duration and currency management and will be set forth in the individual manager guidelines.
    c. Notwithstanding any shorting permitted in (a) above ~~and~~, pursuant to SWIB's policies, the investment guidelines for SMAs will prohibit the Beta One External Managers from shorting any equity securities and from purchasing equity securities in ~~certain~~ secondary offerings.

3. Any use of derivatives, leverage, and shorting allowed will be incorporated into the ex-ante risk assessments and active risk contributions.

4. Approvals: Beta One External Manager allocations are subject to the following approvals:

Investment	Head of PMFA	ED/CIO
New Manager Relationship	Up to $1.75 billion	More than $1.75 billion

Additional Subscriptions to Existing Manager	Up to $2 billion	More than $2 billion
Includes all Funds Alpha investments aggregated with the Manager, regardless of vehicle, strategy or portfolio.		

5. Other guideline limitations notwithstanding, the Funds Alpha Manager or other staff authorized by the head of PMFA may modify, amend or waive terms of Beta One Manager investment management agreements and generally take any and all other actions that are necessary and reasonable to protect, maintain, or enhance the value of SWIB's position in the investments.

6. All redemptions, terminations or reductions of capital will be at the discretion of the Funds Alpha Manager and the head of PMFA in consultation with the head of ARA for policy benchmark exposure consideration.

7. Notwithstanding the above discretion regarding redemptions, terminations or reductions, if the Risk Management Division determines that certain risk attributes in the context of the total Core Fund or the aggregate Beta One Portfolio are undesirable for the Core Fund, Variable Fund or the aggregate portfolio, then the head of Risk Management may recommend redemptions, terminations or reductions to portfolio exposures. With the ED/CIO's concurrence, the Funds Alpha Manager will make the changes as recommended by the head of Risk Management.

W. Private Markets and Funds Alpha Overage Portfolios

Portfolios may be established at the asset class level for private equity, co-invest, real estate, venture capital, hedge fund, and private debt asset classes to provide for (i) excess exposure to certain investment ideas where the sizing of the investment requires it to be held, in part, outside of an individual internal portfolio or (ii) hedging transactions using public or private securities. In each case, a primary investment must be made by the relevant private markets or hedge fund portfolio with the excess exposure or hedging transaction being allocated to an overage portfolio. The relevant private markets or funds alpha portfolio manager will be responsible for portfolio oversight and monitoring of the investment, including the securities in the overage portfolio.

These portfolios may also be used to express investment strategies and ideas that do not fit clearly in any of the private markets or funds alpha portfolios but are attractive from a risk/return perspective. In such cases, no primary investment will be made in the existing private markets portfolios, and the ED/CIO will designate a portfolio manager that will be responsible for portfolio oversight and monitoring.

These portfolios may invest in (1) any instrument approved for the relevant private markets asset class portfolios described elsewhere in these guidelines, and (2) any other public or private securities or derivatives approved for trading by SWIB solely for hedging purposes. Each investment idea expressed in the portfolios shall be approved by the head of PMFA, the relevant portfolio manager, and a majority of the ED/CIO and the heads of ARA and GPMS. Any approved investment shall be reported to the Investment Committee on a monthly basis. Other governance, monitoring, compliance or reporting for the investment may also be specified in the approval. Portfolios will not have a separate benchmark or risk target, but will be included within the benchmark and risk parameters for the applicable aggregated asset class, portfolio, or Core Fund, as applicable and as approved at the time of the investment. If the investment will use active risk assigned to exposure management, it will be noted in the investment approval.

VII. EXTERNAL MANAGEMENT

Portfolios may be managed internally by SWIB investment professionals or externally by money management firms. In making the decision on how the portfolios will be managed, SWIB compares the resources, expertise, and cost of internal management versus external management. If the decision is made to manage the portfolios externally, SWIB will determine whether a separate account or commingled fund best suits SWIB’s needs.

External active and passive managers operate under contractual investment guidelines approved by SWIB’s Investment Committee or by SWIB’s investment management staff, as designated in the Investment Committee Charter.

APPENDIX 1 - APPROVED EXCHANGES

Approved Exchanges for Derivatives Trading as of March 29, 2022*

Australian Securities Exchange
BOX Options Exchange
CBOE Exchanges
Chicago Board of Trade
Chicago Mercantile Exchange
London Stock Exchange
Eurex Exchange
Euronext Exchanges
ICE Futures Exchanges
International Securities Exchange
Montreal Exchange
Nasdaq Exchanges
New York Mercantile Exchange
NYSE Exchanges
Osaka Exchange
TMX (Toronto Stock Exchange)
Tokyo Stock Exchange

*Approved exchanges shall include any and all exchanges that may be acquired by, merged with or otherwise reorganized with or into, or any subset of, any of the above-listed exchanges subsequent to the date above provided that such exchange continues to clear through a Qualifying Central Counterparty (QCCP). This list may be updated for such organizational or name changes from time to time by Legal & Compliance without any additional action of the Investment Committee, and all additions or changes shall be deemed Approved Exchanges for purposes of the WRS Investment Committee Investment Guidelines effective as of the date of such acquisition, merger or reorganization. On a quarterly basis, Compliance shall provide notice to the Investment Committee if there have been any such changes to the list.

The Multi-Asset and Exposure Management Portfolios are approved to trade on any of the above exchanges and any other exchange whose clearing house is a Qualifying Central Counterparty (QCCP) as defined by the Bank for International Settlement (BIS).

APPENDIX 2 - SOFT RISK PARAMETERS

SOFT RISK PARAMETERS – ASSET CLASS AND PORTFOLIO

PORTFOLIO ASSET CLASS CHARACTERISTIC	ASSET CLASS	DISCUSSION TRIGGER
Asset Class Exposure*	Core Fund	
	Global Equities	Target ± 4.6%
	EM Equities	Target ± 2.8%
	Small Cap	Target ± 4.9%
	EAFE Small Cap	Target ± 4.3%
	U.S. Inv Grade	Target ± 4.8%
	High Yield and Levered Loans	Target ± 5.1%
	EM Debt	Target ± 5.6%
	Variable Fund	
	U.S. Equity	Target ± 5.0%
	Int'l Equity	Target ± 5.0%
*Post-Corridor Treatment		
Maximum Small Cap Exposure	CTF Domestic Public Equities	2.75x Benchmark
	VTF Domestic Public Equities	2.75x Benchmark
Ex Ante Tracking Error	Public Equities	0.75% - 2.25%
	Public Fixed	0.4% - 1.2%
	Core Fund	0.6% - 1.8%
	Variable Fund	0.3% - 0.9%
Counterparty Exposure (internal and external separate account portfolios)	WRS (Core and Variable Funds)	5 bp exposure (net of collateral, if any) to a single counterparty
Duration	Public Fixed	+/- 1 year of Benchmark
~~Base Portfolio~~	~~Global Sector Aggregate Portfolio~~	~~8-12% of Aggregate Sector Portfolio~~
~~Scaled Portfolio~~	~~Global Sector Aggregate Portfolio~~	~~88-92% of Aggregate Sector Portfolio~~

PORTFOLIO ASSET CLASS CHARACTERISTIC	ASSET CLASS	DISCUSSION TRIGGER
ACTIVE/INDEXED EQUITIES		
Minimum Number of Holdings		
	Small Cap	100
	Global ~~Sector~~ ~~Aggregate~~Equity Portfolio	~~Lesser of 100 names or 25% of index names~~ <=15 Long/short equity ideas
Ex Ante Tracking Error	Passives (Core Fund and Variable Fund Consolidation):	
	MSCI US	10 bp annualized
	MSCI ex US	20 bp annualized
	MSCI US Small Cap	30 bp annualized
	~~Global Utilities Index Portfolio~~	~~80 bp annualized~~
	Small Cap	2% - 6%
	Global ~~Sector~~ ~~Aggregate~~Equity Portfolio	~~1% -~~4%-12%
Maximum Position Size (Excluding ETFs)	Passives	5% notional value of futures
Maximum EM Active Risk Exposure	Global Equity Portfolio	Emerging Markets Tracking Error Contribution >= 20%
Maximum Convertible Bond Issues	Global Equity Portfolio	0
Ex-Ante Equity Beta	Global Equity Portfolio	Range of -0.3 to +0.3 with a target of zero over a market cycle. This is measured ex ante with a trailing two-year risk sampling period
Single Name Concentration	Small Cap	Benchmark weight ± 2%
	~~Global Sector Aggregate Portfolio~~	~~Benchmark weight ± 2%~~
~~Maximum Total Value of Short Sales~~	~~Global Sector Aggregate Portfolio~~	~~40% of portfolio value~~
Maximum ETF Exposure	Passives	5% of portfolio value
	Small Cap	+/- 15% of portfolio value
	~~Global Sector Aggregate Portfolio~~	~~+/- 15% of portfolio value~~

PORTFOLIO ASSET CLASS CHARACTERISTIC	ASSET CLASS	DISCUSSION TRIGGER
Maximum Company Ownership (Excluding ETFs)	Small Cap	10% of outstanding
	~~Global Sector Aggregate Portfolio~~	~~10% of outstanding~~
Top Ten Holdings	Small Cap	25% of portfolio
P/E Ratio	Small Cap	50%-150% of Benchmark
	~~Global Sector Aggregate Portfolio~~	~~50%-150% of Benchmark~~
Maximum Sector Exposure	Small Cap	Benchmark weight ±10%
	~~Global Sector Aggregate Portfolio~~	~~Benchmark weight ±5%~~
Maximum Notional Uncovered Sold Calls	Passives	5% of portfolio value
	Small Cap	5% of portfolio value
	~~Global Sector Aggregate Portfolios~~	~~5% of portfolio value~~
Maximum Notional Uncovered Sold Puts	Passives	5% of portfolio value
	Small Cap	5% of portfolio value
	~~Global Sector Aggregate Portfolio~~	~~5% of portfolio value~~
Maximum Cash	Passives	1% in unequitized cash
	Small Cap	5%
	~~Global Sector Aggregate Portfolio~~	~~5%~~
FIXED INCOME		
Duration	IG Credit	+/- 1 year of assigned Benchmark
	MBS	+/- 1 year of assigned Benchmark
Maximum Corporate Industry Sector Exposure	IG Credit	Greater of 10% or 3 x Benchmark
Ex Ante Tracking Error	IG Credit	3.0%
	MBS	3.0%

PORTFOLIO ASSET CLASS CHARACTERISTIC	ASSET CLASS	DISCUSSION TRIGGER
	High Yield	3.0%
	Lev Loans	3.0%
Maximum Equity Exposure	High Yield	5% of portfolio value
	Lev Loans	5% of portfolio value
Maximum investments in a single issuer, in the aggregate (excluding instruments listed in SIF guideline #2)	State Investment Fund	5% of portfolio value
MULTI-ASSET		
Ex ante volatility (tracking error) range	Multi-Strat	3% to 8%, measured with a trailing two-year risk sampling period
	~~Global Macro~~	~~2.5% to 12.5%, measured with a trailing two-year risk sampling period~~
Ex-Ante Equity Beta Ex-Ante Spread Beta Ex-Ante Rates Beta Ex-Ante FX Carry Beta	Multi-Strat ~~and Global Macro~~	Range of -0.3 to +0.3 with a target of zero over a market cycle. This is measured ex ante with a trailing two-year risk sampling period
PRIVATE MARKETS & FUNDS ALPHA		
Maximum Co-Investments	Private Equity	30% of core Private Equity Portfolio for Private Equity Co-Investments 30% of Current Return Portfolio for Current Return Co-Investments
Maximum Co-Investments alongside funds with the same sponsor or manager as a fund on which SWIB was conducting due diligence and actively evaluating for a prospective commitment at the time of co-investment[~~2~~3]	Private Equity	5% of core Private Equity Portfolio for Private Equity Co-Investments 5% of Current Return Portfolio for Current Return Co-Investments
Minimum Funds	Private Equity	80% of aggregate Private Equity Portfolio
Maximum Venture Capital Exposure	Venture Capital	25% of Private Equity & Debt

[~~2~~3] If SWIB subsequently commits to a limited partnership or other fund vehicle of the sponsor or manager, then such co-investment shall no longer be included for purposes of calculating this soft parameter.

PORTFOLIO ASSET CLASS CHARACTERISTIC	ASSET CLASS	DISCUSSION TRIGGER
Maximum Development Risk (Direct Holdings Only)	Real Estate	10%
Maximum Single Property Type Exposure - Quarterly	Real Estate	50%
Minimum Core Holdings (Including REIT portfolios)	Real Estate	50%
Maximum Value Holdings	Real Estate	30%
Maximum Opportunistic Holdings	Real Estate	30%
Maximum Core Portfolio Leverage	Real Estate	50%
Maximum Core Fund/Deal Leverage (Must be non-recourse to SWIB)	Real Estate	65%
Maximum Real Estate Equity Portfolio Leverage	Real Estate	60%
Maximum Holdings with Leverage > 80%	Real Estate	10%
Maximum Debt Holdings	Real Estate	25%
Ex ante volatility (tracking error) range	Hedge Fund	2.5% to 6.5%, measured with a trailing two-year risk sampling period
	Beta One	1.0% to 2.0%
Equity Delta to the S&P 500	Hedge Fund	Range of -0.3 to +0.3 with a target of zero over a market cycle. This is measured ex ante with a trailing two-year risk sampling period
Target Beta	Beta One	Range of 0.85 to 1.15 with a target of 1.0
Maximum one-year annual Conditional Value at Risk (CVaR)	Hedge Fund	7% based on trailing two-year risk sampling period
Maximum Hedge Fund Active Risk Contribution	Hedge Fund	6.0 bps of Core Fund active risk
Maximum General Partner/Investment Manager Portfolio Concentration	Hedge Fund	12%
	Beta One	25%

APPENDIX 3 – CTF AND VTF BENCHMARKS

State of Wisconsin Investment Board
Target State Benchmarks 2023[1]

Core Fund Benchmark[2]		
	Current Benchmark	
Public Equity Public Fixed Income Inflation Sensitive Private Equity/Debt Real Estate Cash	48% Fixed Blend of Six Components[3] 25% Fixed Blend of Eight Components[4] 19% Bloomberg US Treasury Inflation-Linked Bond Index 15% Roll-Up of Five Components[5] 8% NCREIF Open End Diversified Core Equity (ODCE) (-15%) Bloomberg Short Term Bank Yield Index (BSBY) + 30bps	- Current and previous benchmark asset classes are weighted by asset class strategic target weights - Current Benchmark updated 4/30/2012 to include Cash, which reflects leverage
Total	100%	

Variable Fund Benchmark			
	Current Benchmark		
Domestic Equities International Equities	70% MSCI USA Investable Market Index 30% MSCI All Country World Index (ACWI) ex US Custom Net Index		
Total	100%		

Note: Roll-Up refers to the market-weighted aggregation of benchmark components or indices, based on SWIB's actual market exposures.

[1] Reflects target weights under the 2023 Asset Allocation implementation plan forecasted for 12/31/2023.

[2] The major asset class weights are established through the annual asset allocation exercise. Private Equity/Debt weights float between 8% and 22% and Real Estate weights float between 4% and 12%. The Private Equity/Debt excess weights are taken from Public Equities and the Real Estate excess weights are taken 50% from Public Equities and 50% from Public Fixed Income.

[3] Public Equity Benchmark: Fixed Blend of Six Components
- 79.70% MSCI World Custom Net Index
- 6.20% MSCI USA Small Cap Index
- 4.20% MSCI World Ex USA Small Cap Custom Net Index
- 6.80% MSCI Emerging Market ex China Custom Net Index
- 1.60% MSCI Emerging Market China Custom Net Index
- 1.50% MSCI Emerging Markets Small Cap Custom Net Index

[4] Public Fixed Income Benchmark: Fixed Blend of Eight Components
- 24.00% Bloomberg Treasury Index
- 24.00% Bloomberg Credit Index
- 20.00% BofA Merrill Lynch Corporate HY Ba/B Index
- 10.00% Morningstar LSTA US Leveraged Loan 100 Index
- 8.00% Bloomberg Mortgage-Backed Securities Index
- 5.00% JPM EMBI Global Diversified
- 5.00% JPM GBI-EM Diversified
- 4.00% Bloomberg Long Treasury Index

[5] Private Equity/Debt Benchmark: Roll-Up of Five Components
- Component One: State Street Private Equity Index
- Component Two: State Street Global Exchange Private Equity Index – Venture Capital
- Component Three: Private Equity Legacy (SW050300) Actual Portfolio Returns
- Component Four: Bloomberg Duration-Adjusted Baa Corporate plus 20 basis points
- Component Five: Burgiss Global Senior Debt Universe

[6] Effective 1/1/2010, the tax treatment of the MSCI benchmark updated to a custom net-of-tax benchmark based on SWIB-specific tax treatment.

STATE OF WISCONSIN INVESTMENT BOARD
Investment Committee Meeting–Open Session

Tuesday, November 22, 2022

Offices of the Investment Board
121 East Wilson Street, Madison, Wisconsin

Committee Members Present:

Edwin Denson, Executive Director/Chief Investment Officer (Chair)
Anne-Marie Fink, Private Markets & Funds Alpha–Chief Investment Officer
Stefano Cavaglia, Senior Portfolio Manager–Asset & Risk Allocation
Derek Drummond, Head of Funds Alpha
Diane Linn, Senior Portfolio Manager–Multi-Asset Strategies
Lin Maung, Senior Portfolio Manager–Private Equity
Jason Rector, Portfolio Manager–Funds Alpha
Nick Stanton, Head of Multi-Asset Strategies
Ivy Zhang, Senior Portfolio Manager–Asset & Risk Allocation

Sara Chandler, Chief Legal Counsel (non-voting)
Hassan Chehime, Head of Risk Management (non-voting)
Rochelle Klaskin, Deputy Executive Director/Chief Administrative Officer (non-voting)

Also in Attendance:

Jeff DeAngelis, Trustee
Chelsey Barczak, GPMS Business Director
Brandon Brickner, Internal Audit Director
Kate Burkart-Paulson, Senior Legal Counsel
Bill Campbell, Data Management Director
Bridget Chen, Senior Analyst–Investment Grade Fixed Income
Christian Comito, Portfolio Manager–Investment Grade Fixed Income
Tunc Dayioglu, Senior Portfolio Manager–Funds Alpha
Trey Edgerle, Compliance Analyst
Greg Fletcher, Performance Director
Tom Freeman, Director of Quantamental Research
Chirag Gandhi, Senior Portfolio Manager–Multi-Asset Strategies
Max Garcia, Analyst–Funds Alpha
Jameson Greenfield, Chief Financial Officer
Brian Heimsoth, Senior Portfolio Manager–Asset & Risk Allocation
Mike Jacobs, Agency Business Director
Phil Johnson, Senior Portfolio Manager–Non-Investment Grade Fixed Income
Ryan Johnston, Analyst–Funds Alpha
Salah Khalaf, Portfolio Manager–Private Markets & Funds Alpha
Jason Krueger, Compliance Analyst
Lisa Lange, Director of Compliance & Senior Legal Counsel
Jonathan Levine, Senior Portfolio Manager–Investment Grade Fixed Income

Alex Li, Analyst–Asset & Risk Allocation
Bill Luetzow, Legal Counsel
Shan Lo, Senior Portfolio Manager–Multi-Asset Strategies
Jon Loboda, Performance Measurement Operations Manager
Matt Marek, Senior Analyst–Asset & Risk Allocation
Damian Maroun, Head of Trading and Execution
Edward Martinez, PMFA Business Director
Frank Mazzucco, Legal Counsel
Joy Mukherjee, Senior Portfolio Manager–U.S. Small Cap Strategy
Chad Neumann, Senior Portfolio Manager–Global Large Cap Strategy
Chase Nicholson, Senior Portfolio Manager–Multi-Asset Strategies
Anand Rakesh, Director of Risk Analytics & Financial Engineering Systems
Robby Richlen, Funds Alpha Analyst
Tom Robinson, Head of Corporate Governance
Joe Roth, Business Analyst
Andrea Ruiz, Senior Portfolio Manager–Liquidity, Inflation & Rates Mgmt.
Susan Schmidt, Head of Equities
Edouard Senechal, Senior Portfolio Manager–Asset & Risk Allocation
Sam Shibilski, Fund Administration Analyst
Jon Simon, Senior Portfolio Manager–Investment Grade Fixed Income
Chris Spiering, Senior Portfolio Manager–Non-Investment Grade Fixed Income
Rob Thornton, ARA Business Director
Dawn Tuescher, Executive Administrative Assistant
Rob Vanderpool, Fund Administration Director
Zhenping Wang, Analyst–Asset & Risk Allocation
Ben Bronson, Aksia
Marc Gesell, Verus Advisory
Chris Levell, NEPC
Joe Nankof, NEPC
Eileen Neill, Verus Advisory
(Some individuals may have attended only portions of the meeting.)

OPEN SESSION

With a quorum present, Edwin Denson, Chair of the Investment Committee, called the meeting to order at 1:02 p.m.

1. Approval of the Minutes

Mr. Denson asked if there were any comments on either the open or closed session minutes of the October 25, 2022 Investment Committee (IC) meeting. Hearing no comments, Mr. Denson stated that the Committee could approve both the open and closed session minutes in open session.

<u>Motion</u>: A motion was made by Mr. Stanton and seconded by Mr. Drummond to approve both the open session and the closed session minutes of October 25, 2022, as presented. The motion passed unanimously.

2. <u>2023 Asset Allocation Recommendations</u>

Chris Levell and Joe Nankof, NEPC, presented the *Asset Allocation Recommendation*, included on pages 10-48 in the meeting materials, noting that there were no substantive changes from the draft recommendations discussed with the Board of Trustees at the October Workshop. Mr. Levell reviewed NEPC's asset allocation recommendations for the Core Trust Fund (CTF) to **(a)** increase the target allocations to Private Equity/Debt from 12% to 15% and Real Estate from 7% to 8%, **(b)** effect a corresponding 4% decrease in the Public Equity allocation from 52% to 48%, **(c)** expand the ranges around the Private Equity/Debt and Real Estate allocations to account for growth and liquidity analysis, and **(d)** adjust the Public Equity sub-asset class allocations to reflect current MSCI index weights (with a China half-weight) while maintaining the Public Fixed Income sub-asset class allocations. Mr. Levell led the Committee's discussion regarding the appropriate reference date with respect to benchmark index weights for the Public Equity sub-asset classes given this year's market volatility. No changes were recommended for the Reference Portfolio or the Variable Trust Fund (VTF).

<u>Motion</u>: A motion was made by Mr. Drummond and seconded by Mr. Rector to approve and to recommend to the Board of Trustees the Asset Allocation Recommendations for 2023, in substantially the form included in the Committee materials. The motion passed unanimously.

3. <u>Annual Benchmark Presentation</u>

Eileen Neill, Verus Advisory, presented the results of the 2022 annual benchmark review, included on pages 49-59 in the meeting materials. She noted that the review focused on three portfolios where the investment mandates changed since their benchmarks were previously reviewed. The first recommendation, which was previously approved by the IC at its October meeting, was to change the State Investment Fund (SIF) benchmark to a 40-day average as of each month end of the daily closing yield on four-week U.S. Treasury Bills, as published by Bloomberg (GBM). The second recommendation, to adopt the MSCI All Country World Index (ACWI) Ex USA Small Cap USD Custom Net as the benchmark for beta one external managers with international small cap equity mandates, was also previously approved by the IC and was effective October 1, 2022 as a provisional benchmark pending approval by the Board at its December meeting. Lastly, she reviewed an additional recommendation to adopt the MSCI World ex-U.S. Small Cap Index as the benchmark for the international developed small cap equities sub-asset class to reflect the revision of the passive implementation strategy to include exposure to Canada. She noted that the first and third benchmarks would, if approved by the Board, be effective as of January 1, 2023, while the second was effective as a provisional benchmark as of October 1, 2022 following the IC's September 2022 approval.

Motion: A motion was made by Mr. Rector and seconded by Mr. Stanton to approve, and to recommend to the Board of Trustees' Benchmark and Performance Committee, the changes to the benchmarks as presented and recommended by SWIB's benchmark consultant, Verus Advisory, in its Annual Benchmark Review, included in the Committee's materials. The motion passed unanimously.

4. Q3 2022 Quarterly Updates

A. Global Large Cap Equities

Susan Schmidt, Head of Equities, referred the Committee to the *Global Public Market Strategies Quarterly Update*, included on pages 60-61 in the meeting materials, for the division's year-to-date performance summary as of September 30, 2022. Ms. Schmidt then introduced Chad Neumann, Senior Portfolio Manager–Global Large Cap Strategy, to provide the *Global Sector Aggregate Strategy Review*, included on pages 62-66 in the meeting materials, for the first three quarters of the year. Mr. Neumann reported that the global sector aggregate portfolio underperformed its benchmark by 66 basis points (bps) year-to-date. He noted that the portfolio as previously structured had been discontinued as of January 3, 2022 and that Ms. Schmidt and the team are developing a proposal for the successor global large cap equity strategy.

Mr. Neumann commented that sector performance remained volatile in Q3 and that stock selection was responsible for the majority of year-to-date underperformance. He highlighted that, despite year-to-date underperformance, the portfolio generated positive relative returns during the third quarter, driven by strong performance from the consumer discretionary and technology sectors. Lastly, Mr. Neumann stated that the portfolio was in compliance with its guidelines and soft risk parameters as of September 30, 2022, with the exception of the soft risk parameter related to ex ante tracking error, which remains low while many sectors are indexed during the portfolio's restructuring.

B. Small Cap Strategy

Joy Mukherjee, Senior Portfolio Manager–U.S. Small Cap Strategy, referred to the *Small Cap Diversified Strategy Review*, included on pages 67-71 in the meeting materials. He reported that the small cap diversified portfolio, which transitioned from the Russell 2000 to the MSCI USA Small Cap Index benchmark as of April 1, underperformed by 109 bps year-to-date. He noted that the relative returns for the one-, three-, and five-year periods were all still positive. He commented that security selection in the health care and consumer sectors and the portfolio's unequitized cash positively impacted performance, while the information technology, energy, materials, and financials sectors detracted. Mr. Mukherjee confirmed that the portfolio was in compliance with its guidelines and soft risk parameters as of September 30, 2022, with the exception of the soft risk parameter related to ex ante tracking error, which the team decreased temporarily in connection with the benchmark transition and the uncertain market environment.

C. Funds Alpha

Derek Drummond, Head of Funds Alpha, presented the *Funds Alpha Q3 2022 Update*, included on pages 72-82 in the meeting materials. He highlighted that Funds Alpha generated approximately $500 million in Excess Value Added (EVA) year-to-date across all three business lines, with beta one fixed income and hedge funds contributing modestly to performance during the third quarter. He also noted that, with over $12.3 billion allocated year-to-date, the team had completed its asset allocation and active risk budget implementation for the year as of the meeting date. Mr. Drummond reviewed manager positioning in the beta one equity and fixed income portfolios, with managers across all Funds Alpha portfolios remaining defensively positioned. With respect to tracking error, he reported that the beta one equity portfolio's tracking error remains above its long-term target in the current volatile market environment, while beta one fixed income is on target and the hedge funds portfolio is below its long-term target tracking error.

Mr. Drummond then commented on the current market environment, noting that **(a)** liquidity is scarce and volatility remains elevated across hedge fund strategies, **(b)** in beta one equities, quantitative managers have generated solid performance year-to-date and the team is seeing elevated amounts of factor and stock dispersion, and **(c)** outflows in the emerging market debt space continued through the third quarter in beta one fixed income.

Regarding the active management environment going forward, Mr. Drummond highlighted that the team anticipates a more fundamentally driven market in 2023, which may provide opportunities for security selection and event-driven strategies. Finally, he confirmed that the portfolios were in compliance with their guidelines and soft risk parameters.

5. Convene in Closed Session

Motion: A motion to go into closed session pursuant to sections 19.85(1)(e) and 19.36(5) of the Wisconsin Statutes to consider confidential strategies for the investment of public funds, including **(i)** the review of active risk profiles of portfolio investments and the Core and Variable Trust Funds, **(ii)** the review of specific proprietary investment strategies and investment instruments related to small cap equities, global large cap equities, funds alpha, currency exposure, asset and risk allocation and exposure management, and **(iii)** the review of broker information, was made by Mr. Cavaglia and seconded by Mr. Drummond.

Mr. Denson called for a roll call vote.

Denson-Aye	Fink-Aye	Cavaglia-Aye	Drummond-Aye
Linn-Aye	Maung-Aye	Rector-Aye	Stanton-Aye
Zhang-Aye			

There being nine ayes and no nays, Mr. Denson declared the motion passed. The Committee convened in closed session at 1:37 p.m. and reconvened in open session at 4:09 p.m.

6. Announcement of Committee Actions Relating to Items Taken up in Closed Session

Mr. Denson announced that, while in closed session, the Committee **(a)** reviewed active risk profiles of portfolio investments and the Core and Variable Trust Funds, **(b)** reviewed specific proprietary investment strategies and investment instruments related to small cap equities, global large cap equities, funds alpha, currency exposure, asset and risk allocation and exposure management, and **(c)** reviewed broker information.

7. QIR Certification

Lisa Lange, Director of Compliance and Senior Legal Counsel, presented a proposal that the Committee appoint Jon Simon as a Qualified Independent Representative (QIR) for Single-Name Credit Default Swaps, as set forth on pages 241-246 in the meeting materials. She noted that the appointment would be for all approved counterparties with whom SWIB has a master netting agreement for such instruments and would be in addition to Mr. Simon's prior appointments as a QIR for Fixed Income Total Return Swap Baskets and Fixed Income ETF Total Return Swaps. Ms. Lange noted that Amendment No. 2 to Mr. Simon's signed Internal QIR Certificate and Agreement documenting his relevant knowledge and experience was included in the meeting materials for the Committee's review. She also explained that Mr. Simon would continue to be subject to quarterly and annual certifications regarding his QIR status as a condition of his employment.

Motion: A motion was made by Mr. Stanton and seconded by Mr. Drummond to approve that Jon Simon meets all of the QIR Criteria with respect to Single-Name Credit Default Swaps for all approved counterparties with whom SWIB has a master netting agreement for such instruments, from time to time, and he is approved to act and is hereby appointed as a QIR with respect to such counterparties. The motion passed unanimously.

8. Currency Task Force Report

Chirag Gandhi, Senior Portfolio Manager–Multi-Asset Strategies, noted that a copy of the agenda for the November 21, 2022 Currency Task Force meeting, with additional materials for reference, was included on pages 247-251 in the meeting materials for the Committee's information. Mr. Gandhi provided commentary on the strength of the U.S. Dollar over the course of the year relative to most other major currencies, with a slight decline at the end of Q3 2022 in line with actions taken by the Federal Reserve in response to inflation.

9. Research Task Force Report

Stefano Cavaglia, Senior Portfolio Manager–Asset & Risk Allocation, presented the *Research Task Force Report*, included on pages 252-253 in the meeting materials. Mr. Cavaglia reviewed the Research Task Force's projects, including **(a)** sponsoring presentations by Steven Kaplan, Professor at the University of Chicago, on private equity investments and by Russell Read, former CIO of CalPERS, on infrastructure investments, **(b)** planning next year's June Investment Forum, which will be held on June 13-14, 2023, including identifying topics and speakers, and **(c)** coordinating future speaker sessions and seminars.

10. Quarterly Performance Review (Q3 2022)

Mr. Denson noted that the *Investment Performance Report*, as of September 30, 2022, was included on pages 254-264 in the meeting materials for the Committee's information.

11. Soft Risk Parameters

Hassan Chehime, Head of Risk Management, noted that the report *Soft Risk Parameters–Asset Class and Portfolio*, as of October 31, 2022, was included on pages 265-266 in the meeting materials for the Committee's review. He noted that there was one new discussion trigger this month relating to the maximum position size within the passive index portfolios, and that three discussion triggers had been dropped since last month relating to the investment grade credit portfolio's active duration and the ex ante tracking error for the mortgage-backed securities (MBS) and beta one portfolios.

12. Future Meeting Topics

Mr. Denson noted that draft agendas for the December 15, 2022 and January 24, 2023 IC meetings were included on pages 267-270 in the meeting materials for the Committee's review.

13. Adjournment

Motion: A motion to adjourn the meeting was made by Mr. Drummond and seconded by Mr. Cavaglia. The motion passed unanimously, and the meeting adjourned at 4:17 p.m.

Date of Committee Approval: 12/15/2022

Signed: */s/ Sara Chandler*
Sara Chandler, Secretary
Investment Committee

STATE OF WISCONSIN INVESTMENT BOARD
Investment Committee Meeting–Open Session

Thursday, December 15, 2022

Offices of the Investment Board
121 East Wilson Street, Madison, Wisconsin

Committee Members Present:

Edwin Denson, Executive Director/Chief Investment Officer (Chair)
Anne-Marie Fink, Private Markets & Funds Alpha–Chief Investment Officer
Stefano Cavaglia, Senior Portfolio Manager–Asset & Risk Allocation
Derek Drummond, Head of Funds Alpha
Diane Linn, Senior Portfolio Manager–Multi-Asset Strategies
Lin Maung, Senior Portfolio Manager–Private Equity
Jason Rector, Portfolio Manager–Funds Alpha
Mike Shearer, Head of Fixed Income Strategies
Nick Stanton, Head of Multi-Asset Strategies
Ivy Zhang, Senior Portfolio Manager–Asset & Risk Allocation

Sara Chandler, Chief Legal Counsel (non-voting)
Hassan Chehime, Head of Risk Management (non-voting)
Rochelle Klaskin, Deputy Executive Director/Chief Administrative Officer (non-voting)

Also in Attendance:

Joe Amoyal, Senior Portfolio Manager–Non-Investment Grade Fixed Income
Nathan Ballard, Senior Legal Counsel
Chelsey Barczak, GPMS Business Director
Brandon Brickner, Internal Audit Director
Kate Burkart-Paulson, Senior Legal Counsel
Bill Campbell, Data Management Director
Bridget Chen, Senior Analyst–Investment Grade Fixed Income
Tunc Dayioglu, Senior Portfolio Manager–Funds Alpha
Kliton Duri, Senior Portfolio Manager–Non-Investment Grade Fixed Income
Chris Eckerman, Senior Portfolio Manager–Private Equity
Trey Edgerle, Compliance Analyst
Greg Fletcher, Performance Director
Max Garcia, Analyst–Funds Alpha
Jameson Greenfield, Chief Financial Officer
Brian Heimsoth, Senior Portfolio Manager–Asset & Risk Allocation
Mike Jacobs, Agency Business Director
Phil Johnson, Senior Portfolio Manager–Non-Investment Grade Fixed Income
Ryan Johnston, Analyst–Funds Alpha
Salah Khalaf, Portfolio Manager–Private Markets & Funds Alpha
Jason Krueger, Compliance Analyst
Lisa Lange, Director of Compliance & Senior Legal Counsel

Jonathan Levine, Senior Portfolio Manager–Investment Grade Fixed Income
Alex Li, Analyst–Asset & Risk Allocation
Shan Lo, Senior Portfolio Manager–Multi-Asset Strategies
Bill Luetzow, Legal Counsel
Matt Marek, Senior Analyst–Asset & Risk Allocation
Damian Maroun, Head of Trading and Execution
Frank Mazzucco, Legal Counsel
Chad Neumann, Senior Portfolio Manager–Global Large Cap Strategy
Chase Nicholson, Senior Portfolio Manager–Multi-Asset Strategies
Scott Parrish, Head of Private Equity
Chris Prestigiacomo, Head of Private Debt & Venture Capital
Anand Rakesh, Director of Risk Analytics & Financial Engineering Systems
Robby Richlen, Funds Alpha Analyst
Jason Rothenberg, Head of Real Estate
Edouard Senechal, Senior Portfolio Manager–Asset & Risk Allocation
Sam Shibilski, Fund Administration Analyst
Chris Spiering, Senior Portfolio Manager–Non-Investment Grade Fixed Income
Matt Terpstra, Internal Auditor
Rob Thornton, ARA Business Director
Leif Thybony, Senior Portfolio Manager–Non-Investment Grade Fixed Income
Dawn Tuescher, Executive Administrative Assistant
Rob Vanderpool, Fund Administration Director
Zhenping Wang, Analyst–Asset & Risk Allocation
Chris Levell, NEPC
Joe Nankof, NEPC
Eileen Neill, Verus Advisory
(Some individuals may have attended only portions of the meeting.)

OPEN SESSION

With a quorum present, Edwin Denson, Chair of the Investment Committee, called the meeting to order at 1:02 p.m.

1. <u>Approval of the Minutes</u>

Mr. Denson asked if there were any comments on either the open or closed session minutes of the November 22, 2022 Investment Committee (IC) meeting. Hearing no comments, Mr. Denson stated that the Committee could approve both the open and closed session minutes in open session.

Motion: A motion was made by Mr. Shearer and seconded by Mr. Rector to approve both the open session and the closed session minutes of November 22, 2022, as presented. The motion passed unanimously.

2. Private Markets & Funds Alpha Division Update

Anne-Marie Fink, Private Markets & Funds Alpha–Chief Investment Officer, presented the *Private Markets & Funds Alpha Overview*. Ms. Fink reported that the Private Markets & Funds Alpha (PMFA) division's investment pacing model remained substantially similar to what was previously presented to the Committee. After market shifts during the year, she noted that the aggregate private equity asset class (including the current return, venture capital, private debt, and overage portfolios) constituted approximately 18% of the Core Trust Fund (CTF) and the real estate portfolio made up approximately 10% of the CTF. She noted that those percentages had remained steady over recent months, with the portfolios funding capital calls while the size of the CTF increased.

Ms. Fink then highlighted the PMFA division's ability to capitalize on compelling strategic opportunities generated by market dislocations, even amid asset allocation constraints driven by the denominator effect. She reported that the pace of new commitments had slowed in the second half of the year, with the portfolios committing less than they had forecasted at the beginning of the year. Ms. Fink then commented on the positive performance from the PMFA division in 2022, including Funds Alpha generating approximately $500 million in Excess Value Added (EVA) year-to-date. Finally, Ms. Fink answered questions regarding aggregate distributions received in 2022 and anticipated distributions in 2023.

3. Q3 2022 Quarterly Updates

A. Private Equity

Scott Parrish, Head of Private Equity, presented the *Quarterly Activity Report – Private Equity*, included on pages 11-33 in the meeting materials. He provided a private equity market update for the first three quarters of 2022, noting that **(a)** both global private equity fundraising dollars and the number of funds decreased relative to the first three quarters of 2021, **(b)** although dry powder has decreased since its peak in 2020, there is still a significant amount of capital available to be deployed, with more than half of the available capital attributable to vintage years 2021 and 2022, **(c)** U.S. private equity deal activity in dollars and number of deals has increased slightly year-over-year, while the number of exits and exit value both declined significantly, and **(d)** portfolio company exit activity was split evenly between strategic acquirers and sponsor-to-sponsor transactions, with virtually no market for IPOs for private equity-backed companies.

Mr. Parrish reported that, as of September 30, 2022, the market value of the aggregate private equity asset class, including the venture capital, private debt, and overage portfolios, made up approximately 18.6% of the CTF. He observed that distributions were significantly lower in the first three quarters of 2022 relative to the same period in 2021, due primarily to a significant decline in deal activity.

With respect to performance, Mr. Parrish highlighted that the private equity portfolios all outperformed their benchmarks for the one-, three-, and five-year time periods and that, as of June 30, 2022, the combined private equity and co-investment portfolios achieved second quartile performance for vintage years 2014-2021. He also discussed the five-year internal rates of return (IRRs) for the portfolios' sub-strategies, noting particularly strong performance in growth equity while the lower performance from credit/distressed is expected to improve as distressed managers call more capital in the current market environment.

Mr. Parrish then discussed the private equity portfolio's **(a)** public versus private portfolio company exposure, noting that public exposure had decreased year-over-year as a result of lower market valuations and fewer portfolio companies exiting via public offerings, and **(b)** industry diversification, noting the consistent overweight to information technology and the increase in energy. He highlighted the commitments made in Q3 2022, with approximately $780 million made in fund commitments, reviewed the portfolio pipeline for Q4 2022, and confirmed that the portfolio remained in compliance with all investment guidelines.

B. <u>Real Estate</u>

Jason Rothenberg, Head of Real Estate, presented the *Quarterly Activity Report – Real Estate*, included on pages 34-47 in the meeting materials. He discussed the current market environment, noting that **(a)** vacancy rates relative to historical averages diverged significantly by property type, with lower industrial vacancy rates and elevated office vacancy rates, **(b)** solid net operating income (NOI) growth and capitalization rate compression in the industrial sector are the primary drivers of benchmark performance, and **(c)** there has been a decrease in expectations for real estate returns in 2023.

Mr. Rothenberg then reviewed the real estate portfolio, noting that the portfolio's market value of approximately $11.1 billion as of September 30, 2022 represented approximately 9.6% of the CTF, which had increased due to portfolio appreciation and as a result of the denominator effect. He reviewed the portfolio's risk profile, noted that leverage is expected to increase, and answered questions regarding the potential impact on performance of the portfolio's leverage relative to benchmark levels. He then discussed the portfolio's **(a)** diversification by property type, noting that the underweight to the industrial sector has negatively affected relative performance in 2022 but that the underweight to the traditional office sector is expected to continue to contribute positively to relative performance, and **(b)** exposure by geographic market, noting that the portfolio has tilted away from the primary gateway markets, in line with the benchmark, and towards secondary domestic markets.

Mr. Rothenberg reviewed the portfolio's performance, reporting outperformance relative to the benchmark over the five- and ten-year time periods, with strong absolute returns for the one- and three-year time periods despite trailing the benchmark. Mr. Rothenberg answered questions regarding security selection and the performance of industrial assets held by the portfolio. Lastly, he **(a)** highlighted the new commitments made in the quarter, **(b)** discussed the pipeline under review, and **(c)** confirmed that the portfolio remained in compliance with its investment guidelines.

C. <u>Private Debt</u>

Chris Prestigiacomo, Head of Private Debt & Venture Capital, presented the *Private Debt Portfolio Investment Committee Quarterly Report,* included on pages 48-59 in the meeting materials. He provided a private debt market update for the third quarter, noting that

(a) fundraising has slowed significantly, consistent with the broader market selloff and volatile macro environment, although experienced managers that have shown the ability to invest across credit cycles are still having success fundraising, **(b)** direct lending has grown as a percentage of overall financing for private equity-led transactions, as syndicated bank financing has declined, **(c)** dry powder available to invest has decreased to its lowest level in four years, and **(d)** overall market default rates increased during the third quarter and covenant-lite loan issuances remain high.

Mr. Prestigiacomo then reviewed the portfolio's **(a)** characteristics, noting that average coupon and average life remained steady, while average duration decreased slightly, **(b)** barbell credit strategy, with staff targeting loans of both higher and lower credit quality than the benchmark to maintain an overall portfolio weighting of BBB, **(c)** current below investment grade (BIG) holdings of 12%, up 2% from the prior quarter but below the portfolio limit of 25%, and **(d)** sector mix, noting that the historical overweight to industrial and underweight to financials arises from the opportunity set of the portfolio's legacy geographic limitations. Comparing the Wisconsin and non-Wisconsin loans in the portfolio, he commented that the average coupon is higher for Wisconsin loans due to higher BIG loans outstanding in Wisconsin, and he noted that the team is continuing to expand its market opportunity outside of the legacy non-Wisconsin region.

Lastly, Mr. Prestigiacomo reviewed the portfolio's performance, highlighting that the portfolio outperformed its benchmark over all time periods, despite negative absolute performance for the one-year period, and reported that there were no problem credits or workouts in the portfolio, which remained in compliance with its guidelines.

4. Convene in Closed Session

Motion: A motion to go into closed session pursuant to sections 19.85(1)(e) and 19.36(5) of the Wisconsin Statutes to consider confidential strategies for the investment of public funds, including **(a)** the review of active risk profiles of portfolio investments and the Core and Variable Trust Funds, and **(b)** the review of specific proprietary investment strategies and investment instruments related to private equity, real estate, private debt, venture capital and exposure management, was made by Ms. Fink and seconded by Mr. Drummond.

Mr. Denson called for a roll call vote.

Denson-Aye	Fink-Aye	Cavaglia-Aye	Drummond-Aye
Linn-Aye	Maung-Aye	Rector-Aye	
Shearer-Aye	Stanton-Aye	Zhang-Aye	

There being ten ayes and no nays, Mr. Denson declared the motion passed. The Committee convened in closed session at 1:43 p.m. and reconvened in open session at 3:12 p.m.

5. Announcement of Committee Actions Relating to Items Taken up in Closed Session

Mr. Denson announced that, while in closed session, the Committee **(a)** reviewed active risk profiles of portfolio investments and the Core and Variable Trust Funds, and **(b)** reviewed specific proprietary investment strategies and investment instruments related to private equity, real estate, private debt, venture capital and exposure management.

6. Transition Update (Q3 2022)

Mr. Denson reported that there were no transition events in Q3 2022.

7. Soft Risk Parameters

Hassan Chehime, Head of Risk Management, noted that the report *Soft Risk Parameters– Asset Class and Portfolio*, as of November 30, 2022, was included on pages 154-155 in the meeting materials for the Committee's review. He noted that there were four new discussion triggers this month relating to the ex ante tracking error for each of the public fixed income asset class, the global macro portfolio, and the MSCI US Small Cap Index Consolidation, as well as the ex ante volatility range for the hedge fund portfolio.

He also noted that two discussion triggers had been dropped since last month relating to the maximum position size within the passive index portfolios and the global macro portfolio's ex ante spread beta.

8. Future Meeting Topics

Mr. Denson noted that draft agendas for the January 24, 2023 and February 23, 2023 IC meetings were included on pages 156-159 in the meeting materials for the Committee's review.

9. Adjournment

Motion: A motion to adjourn the meeting was made by Mr. Stanton and seconded by Ms. Fink. The motion passed unanimously, and the meeting adjourned at 3:14 p.m.

Date of Committee Approval: 01/24/2023

Signed: */s/ Sara Chandler*
Sara Chandler, Secretary
Investment Committee

STATE OF WISCONSIN INVESTMENT BOARD
Investment Committee Meeting–Open Session

Tuesday, January 24, 2023

Offices of the Investment Board
121 East Wilson Street, Madison, Wisconsin

Committee Members Present:

Edwin Denson, Executive Director/Chief Investment Officer (Chair)
Anne-Marie Fink, Private Markets & Funds Alpha–Chief Investment Officer
Todd Mattina, Head Economist & Asset and Risk Allocation Chief Investment Officer
Stefano Cavaglia, Senior Portfolio Manager–Asset & Risk Allocation
Derek Drummond, Head of Funds Alpha
Diane Linn, Senior Portfolio Manager–Multi-Asset Strategies
Lin Maung, Senior Portfolio Manager–Private Equity
Jason Rector, Portfolio Manager–Funds Alpha
Mike Shearer, Head of Fixed Income Strategies
Nick Stanton, Head of Multi-Asset Strategies
Ivy Zhang, Senior Portfolio Manager–Asset & Risk Allocation

Sara Chandler, Chief Legal Counsel (non-voting)
Hassan Chehime, Head of Risk Management (non-voting)

Also in Attendance:

Nathan Ballard, Senior Legal Counsel
Chelsey Barczak, GPMS Business Director
Brandon Brickner, Internal Audit Director
Kate Burkart-Paulson, Senior Legal Counsel
Bill Campbell, Data Management Director
Bridget Chen, Senior Analyst–Investment Grade Fixed Income
Dan Cox, Senior Portfolio Manager–Investment Grade Fixed Income
Kliton Duri, Senior Portfolio Manager–Non-Investment Grade Fixed Income
Chris Eckerman, Senior Portfolio Manager–Private Equity
Trey Edgerle, Compliance Analyst
Greg Fletcher, Performance Director
Chirag Gandhi, Senior Portfolio Manager–Multi-Asset Strategies
Jameson Greenfield, Chief Financial Officer
Brian Heimsoth, Senior Portfolio Manager–Asset & Risk Allocation
Mike Jacobs, Agency Business Director
Phil Johnson, Senior Portfolio Manager–Non-Investment Grade Fixed Income
Ryan Johnston, Analyst–Funds Alpha
Salah Khalaf, Portfolio Manager–Private Markets & Funds Alpha
Leo Kropywiansky, Senior Portfolio Manager–Asset & Risk Allocation

Jason Krueger, Compliance Analyst
Lisa Lange, Director of Compliance & Senior Legal Counsel
Jonathan Levine, Senior Portfolio Manager–Investment Grade Fixed Income Shan Lo, Senior Portfolio Manager–Multi-Asset Strategies
Jeff Lucas, Senior Portfolio Manager–Investment Grade Fixed Income
Bill Luetzow, Legal Counsel
Matt Marek, Senior Analyst–Asset & Risk Allocation
Damian Maroun, Head of Trading and Execution
Edward Martinez, PMFA Business Director
Frank Mazzucco, Legal Counsel
Scott Parrish, Head of Private Equity
Chris Prestigiacomo, Head of Private Debt & Venture Capital
Anand Rakesh, Director of Risk Analytics & Financial Engineering Systems
Tom Robinson, Head of Corporate Governance
Jason Rothenberg, Head of Real Estate
Andrea Ruiz, Senior Portfolio Manager–Liquidity, Inflation & Rates Mgmt.
Edouard Senechal, Senior Portfolio Manager–Asset & Risk Allocation
Jon Simon, Senior Portfolio Manager–Investment Grade Fixed Income
Chris Spiering, Senior Portfolio Manager–Non-Investment Grade Fixed Income
Mike Stamm, Director of Financing & Collateral Management
Matt Terpstra, Internal Auditor
Rob Thornton, ARA Business Director
Dawn Tuescher, Executive Administrative Assistant
Rob Vanderpool, Fund Administration Director
Zhenping Wang, Analyst–Asset & Risk Allocation
Chris Levell, NEPC
Joe Nankof, NEPC
Eileen Neill, Verus Advisory
(Some individuals may have attended only portions of the meeting.)

OPEN SESSION

With a quorum present, Edwin Denson, Chair of the Investment Committee, called the meeting to order at 1:01 p.m. He welcomed Todd Mattina, Head Economist & Asset and Risk Allocation Chief Investment Officer, to the Investment Committee.

1. <u>Approval of the Minutes</u>

Mr. Denson asked if there were any comments on either the open or closed session minutes of the December 15, 2022 Investment Committee (IC) meeting. Hearing no comments, Mr. Denson stated that the Committee could approve both the open and closed session minutes in open session.

Motion: A motion was made by Mr. Stanton and seconded by Mr. Maung to approve both the open session and the closed session minutes of December 15, 2022, as presented. The motion passed unanimously.

2. Amendments to SWIB Investment Committee Charter

Sara Chandler, Chief Legal Counsel, noted that the *SWIB Investment Committee Charter*, included on pages 10-13 in the meeting materials for the Committee's reference, is reviewed on an annual basis. Ms. Chandler reported that legal staff is not recommending any amendments to the existing Charter for the coming year and offered to answer any questions.

3. Q4 2022 Quarterly Updates

Nick Stanton, Head of Multi-Asset Strategies, presented the *Global Public Markets Strategies Quarterly Update, Q4 2022*, included on pages 14-24 in the meeting materials. Mr. Stanton reported on performance from the Global Public Market Strategies division for Q4 2022, noting that only one of the seven division strategies generated positive performance relative to its benchmark year-to-date, with all division strategies and benchmarks exhibiting negative absolute returns year-to-date in line with the global public markets environment. He then confirmed that each portfolio was in compliance with its guidelines in Q4 2022.

Mike Shearer, Head of Fixed Income Strategies, then provided a market review, included on pages 25-28 in the meeting materials. He noted that **(a)** Q4 2022 demonstrated less volatility than prior quarters, as inflationary pressures moderated and the Federal Reserve signaled more modest interest rate increases in the future, **(b)** the U.S. dollar weakened broadly relative to both developed and emerging market currencies, and **(c)** equity markets rallied during the quarter.

4. Convene in Closed Session

Motion: A motion to go into closed session at this meeting as authorized pursuant to sections 19.85(1)(e) and 19.36(5) of the Wisconsin Statutes to consider confidential strategies for the investment of public funds, including **(i)** the review of active risk profiles of portfolio investments and the Core and Variable Trust Funds, and **(ii)** the review of specific proprietary investment strategies and investment instruments related to private markets & funds alpha, short-term credit, fixed income strategies, multi-asset, leverage and exposure management was made by Ms. Fink and seconded by Mr. Shearer.

Mr. Denson called for a roll call vote.

Denson-Aye	Fink-Aye	Cavaglia-Aye	Drummond-Aye
Linn-Aye	Mattina-Aye	Maung-Aye	Rector-Aye
Shearer-Aye	Stanton-Aye	Zhang-Aye	

There being eleven ayes and no nays, Mr. Denson declared the motion passed. The Committee convened in closed session at 1:10 p.m. and reconvened in open session at 4:49 p.m.

5. Announcement of Committee Actions Relating to Items Taken up in Closed Session

Mr. Denson announced that, while in closed session, the Committee **(a)** reviewed active risk profiles of portfolio investments and the Core and Variable Trust Funds, and **(b)** reviewed specific proprietary investment strategies and investment instruments related to private markets & funds alpha, short-term credit, fixed income strategies, multi-asset, leverage and exposure management.

6. Soft Risk Parameters

Hassan Chehime, Head of Risk Management, noted that the report *Soft Risk Parameters–Asset Class and Portfolio*, as of December 31, 2022, was included on pages 187-188 in the meeting materials for the Committee's review. He noted that three discussion triggers had been dropped last month relating to the ex ante tracking error for each of the MSCI US Small Cap Index Consolidation and the high yield portfolio, as well as the ex ante volatility range for the hedge fund portfolio. He noted that the ex ante tracking error for the global macro portfolio remained outside its target range but that the portfolio is no longer active.

7. Future Meeting Topics

Mr. Denson noted that draft agendas for the February 23, 2023 and March 30, 2023 Committee meetings were included on pages 189-192 in the meeting materials for the Committee's review.

8. Adjournment

Motion: A motion to adjourn the meeting was made by Mr. Drummond and seconded by Mr. Shearer. The motion passed unanimously, and the meeting adjourned at 4:51 p.m.

Date of Committee Approval: 02/23/2023

Signed: */s/ Sara Chandler*
Sara Chandler, Secretary
Investment Committee

AGENDA / NOTICE

SWIB STATE OF WISCONSIN INVESTMENT BOARD

Name of Meeting: Staff Investment Committee Meeting
Date/Time: Thursday, February 23, 2023 1:00 pm
Room: Presentation Room – 1st Floor
Address: 121 E. Wilson St., Madison WI 53703

Est. Time Minutes	Action Item	Topic	Presenter
		OPEN SESSION	
	Motion	1. Approval of the Minutes – Open Session A. January 24, 2023	
35		2. Q4 2022 Quarterly Updates A. Small Cap B. Global Large Cap Equities C. Funds Alpha	 Joy Mukherjee Susan Schmidt Derek Drummond
	Motion	**CLOSED SESSION***	
	Motion	**RECONVENE IN OPEN SESSION**	
		3. Announcement of Committee Actions Relating to Items Taken Up in Closed Session	
5	Motion	4. Asset Allocation Recommendation	Chris Levell, NEPC Joe Nankof, NEPC
5	Motion	5. Public Equity Benchmark Recommendation	Chris Levell, NEPC Joe Nankof, NEPC
10	Motion	6. Amendments to Investment Committee WRS Investment Guidelines	Sara Chandler
5		7. Currency Task Force Report	Chirag Gandhi
10		8. Research Task Force Report a. June Investment Forum Preview	Stefano Cavaglia Beth Holzberger

* A motion to go into closed session at this meeting is authorized pursuant to sections 19.85(1)(e) and 19.36(5) of the Wisconsin Statutes (a) to consider confidential strategies for the investment of public funds, including (i) the review of active risk profiles of portfolio investments and the Core and Variable Trust Funds, (ii) the review of specific proprietary investment strategies and investment instruments related to global public markets, small cap equities, global large cap equities, funds alpha and exposure management, and (iii) the review of broker information, and (b) to discuss and approve prior closed session minutes that discuss the same. The Committee may convene in additional closed sessions or announce additional closed session items at the meeting in accordance with the procedure outlined in the Attorney General's Opinion reported at 66 OAG 106 (1977). Whenever a closed session is held, the committee will subsequently reconvene in open session to cover remaining agenda items.

		9. Quarterly Performance Review (Q4 2022) (No presentation unless requested)	
		10. QIR Annual Certification Report (No presentation unless requested)	
		11. Soft Risk Parameters (No presentation unless requested)	
		12. Future Meeting Topics	
	Motion	13. Motion to Adjourn	
		NOTES: Items may be taken in order other than listed. *The meeting site is physical accessible. Upon prior request, reasonable accommodations will be provided.*	

Future Meetings 3/30/23 – March Committee Mtg. 4/25/23 – April Committee Mtg. 5/23/23 – May Committee Mtg. 6/27-23 – June Committee Mtg. 7/25/23 – July Committee Mtg. 8/22/23 – August Committee Mtg. 9/26/23 – September Committee Mtg. 10/24/23 – October Committee Mtg. 11/28/23 – November Committee Mtg. 12/21/23 – December Committee Mtg.	**Voting Committee Members:** **Edwin Denson (Chair)**, Executive Director/Chief Investment Officer **Anne-Marie Fink**, Private Markets & Funds Alpha–CIO **Todd Mattina**, Head Economist, Asset & Risk Allocation–CIO **Stefano Cavaglia**, Senior Portfolio Manager–Asset & Risk Allocation **Derek Drummond**, Head of Funds Alpha **Diane Linn**, Senior Portfolio Manager–Multi-Asset Strategies **Lin Maung**, Senior Portfolio Manager–Private Equity **Jason Rector**, Portfolio Manager–Funds Alpha **Mike Shearer**, Head of Fixed Income Strategies **Nick Stanton**, Head of Multi-Asset Strategies **Ivy Zhang**, Senior Portfolio Manager–Asset & Risk Allocation **Non-voting Committee Members** **Rochelle Klaskin**, Deputy Executive Director/CAO **Sara Chandler (Secretary)**, Chief Legal Counsel **Hassan Chehime**, Head of Risk Management

AGENDA / NOTICE

SWIB STATE OF WISCONSIN INVESTMENT BOARD

Name of Meeting: Staff Investment Committee Meeting
Date/Time: Thursday, March 30, 2023 1:00 pm
Room: Presentation Room – 1st Floor
Address: 121 E. Wilson St., Madison WI 53703

Est. Time Minutes	Action Item	Topic	Presenter
		OPEN SESSION	
	Motion	1. Approval of the Minutes – Open Session A. February 23, 2023	
5		2. Private Markets & Funds Alpha Division Update	Anne-Marie Fink
30		3. Q4 2022 Quarterly Updates A. Private Equity B. Real Estate C. Private Debt	 Scott Parrish Jason Rothenberg Chris Prestigiacomo
	Motion	**CLOSED SESSION***	
	Motion	**RECONVENE IN OPEN SESSION**	
		4. Announcement of Committee Actions Relating to Items Taken Up in Closed Session	
5		5. Transition Update (Q4 2022)	Joe Roth
		6. Soft Risk Parameters (No presentation unless requested)	
		7. Future Meeting Topics	
	Motion	8. Motion to Adjourn	

* A motion to go into closed session at this meeting is authorized pursuant to sections 19.85(1)(e) and 19.36(5) of the Wisconsin Statutes (a) to consider confidential strategies for the investment of public funds, including (i) the review of active risk profiles of portfolio investments and the Core and Variable Trust Funds, and (ii) the review of specific proprietary investment strategies and investment instruments related to private equity, real estate, private debt, venture capital and exposure management, and (b) to discuss and approve prior closed session minutes that discuss the same. The Committee may convene in additional closed sessions or announce additional closed session items at the meeting in accordance with the procedure outlined in the Attorney General's Opinion reported at 66 OAG 106 (1977). Whenever a closed session is held, the committee will subsequently reconvene in open session to cover remaining agenda items.

		NOTES: Items may be taken in order other than listed. *The meeting site is physical accessible. Upon prior request, reasonable accommodations will be provided.*	

Future Meetings 4/25/23 – April Committee Mtg. 5/23/23 – May Committee Mtg. 6/27-23 – June Committee Mtg. 7/25/23 – July Committee Mtg. 8/22/23 – August Committee Mtg. 9/26/23 – September Committee Mtg. 10/24/23 – October Committee Mtg. 11/28/23 – November Committee Mtg. 12/21/23 – December Committee Mtg.	**Voting Committee Members:** **Edwin Denson (Chair)**, Executive Director/Chief Investment Officer **Anne-Marie Fink**, Private Markets & Funds Alpha–CIO **Todd Mattina**, Head Economist, Asset & Risk Allocation–CIO **Stefano Cavaglia**, Senior Portfolio Manager–Asset & Risk Allocation **Derek Drummond**, Head of Funds Alpha **Diane Linn**, Senior Portfolio Manager–Multi-Asset Strategies **Lin Maung**, Senior Portfolio Manager–Private Equity **Jason Rector**, Portfolio Manager–Funds Alpha **Mike Shearer**, Head of Fixed Income Strategies **Nick Stanton**, Head of Multi-Asset Strategies **Ivy Zhang**, Senior Portfolio Manager–Asset & Risk Allocation **Non-voting Committee Members** **Rochelle Klaskin**, Deputy Executive Director/CAO **Sara Chandler (Secretary)**, Chief Legal Counsel **Hassan Chehime**, Head of Risk Management

AGENDA / NOTICE

SWIB STATE OF WISCONSIN INVESTMENT BOARD

Name of Meeting: Staff Investment Committee Meeting
Date/Time: Tuesday, April 25, 2023 1:00 pm
Room: 1st Floor Conference Room
Address: 4703 Madison Yards Way, Madison, WI 53705

Est. Time Minutes	Action Item	Topic	Presenter
		OPEN SESSION	
	Motion	1. Approval of the Minutes – Open Session A. March 30, 2023	
5		2. June Investment Forum Preview	Beth Holzberger
10		3. Q1 2023 Quarterly Updates	Mike Shearer Nick Stanton
	Motion	**CLOSED SESSION***	
	Motion	**RECONVENE IN OPEN SESSION**	
		4. Announcement of Committee Actions Relating to Items Taken Up in Closed Session	
		5. Soft Risk Parameters (No presentation unless requested)	
		6. Future Meeting Topics	
	Motion	7. Motion to Adjourn	
		NOTES: Items may be taken in order other than listed. *The meeting site is physical accessible. Upon prior request, reasonable accommodations will be provided.*	

* A motion to go into closed session at this meeting is authorized pursuant to sections 19.85(1)(e) and 19.36(5) of the Wisconsin Statutes (a) to consider confidential strategies for the investment of public funds, including (i) the review of active risk profiles of portfolio investments and the Core and Variable Trust Funds and (ii) the review of specific proprietary investment strategies and investment instruments related to global large cap equities, small cap equities, short-term credit, fixed income strategies and exposure management, and (b) to discuss and approve prior closed session minutes that discuss the same. The Committee may convene in additional closed sessions or announce additional closed session items at the meeting in accordance with the procedure outlined in the Attorney General's Opinion reported at 66 OAG 106 (1977). Whenever a closed session is held, the committee will subsequently reconvene in open session to cover remaining agenda items.

Future Meetings	Voting Committee Members:
5/23/23 – May Committee Mtg. 6/27-23 – June Committee Mtg. 7/25/23 – July Committee Mtg. 8/22/23 – August Committee Mtg. 9/26/23 – September Committee Mtg. 10/24/23 – October Committee Mtg. 11/28/23 – November Committee Mtg. 12/21/23 – December Committee Mtg.	**Edwin Denson (Chair)**, Executive Director/Chief Investment Officer **Anne-Marie Fink**, Private Markets & Funds Alpha–CIO **Todd Mattina**, Head Economist, Asset & Risk Allocation–CIO **Stefano Cavaglia**, Senior Portfolio Manager–Asset & Risk Allocation **Derek Drummond**, Head of Funds Alpha **Diane Linn**, Senior Portfolio Manager–Multi-Asset Strategies **Lin Maung**, Senior Portfolio Manager–Private Equity **Jason Rector**, Portfolio Manager–Funds Alpha **Mike Shearer**, Head of Fixed Income Strategies **Nick Stanton**, Head of Multi-Asset Strategies **Ivy Zhang**, Senior Portfolio Manager–Asset & Risk Allocation **Non-voting Committee Members** **Rochelle Klaskin**, Deputy Executive Director/CAO **Sara Chandler (Secretary)**, Chief Legal Counsel **Hassan Chehime**, Head of Risk Management

STATE OF WISCONSIN INVESTMENT BOARD
Enterprise Risk and Compliance Committee-Open Session

Wednesday, November 30, 2022

Offices of the Investment Board
121 East Wilson Street, Madison, Wisconsin

Committee Members Present:	Lisa Lange, Director of Compliance & Senior Legal Counsel (Co-Chair) Jameson Greenfield, Chief Financial Officer (Vice Chair) Sara Chandler, Chief Legal Counsel (Secretary) Edwin Denson, Executive Director/Chief Investment Officer Brian Heimsoth, Portfolio Manager Mike Jacobs, Agency Business Director Rochelle Klaskin, Deputy Executive Director/Chief Administrative Officer Brandon Brickner, Internal Audit Director *(non-voting)*
Others Present:	Eric Barber, Senior Legal Counsel Sunil Nair, Operational Risk Director Dawn Tuescher, Executive Administrative Assistant

Open Session

Lisa Lange, Co-Chair of the Enterprise Risk and Compliance Committee ("ERCC"), declared that a quorum was present and called the meeting to order at 11:01 a.m.

1. Approval of Minutes

Ms. Lange confirmed that there were no questions or comments on the open session minutes of May 18, 2022, which were included on pages 4-6 in the meeting materials.

Motion: A motion was made by Ms. Klaskin and seconded by Ms. Chandler to approve the open session minutes of May 18, 2022, as presented. The motion passed unanimously.

2. Risk Management Division Update

Sunil Nair, Operational Risk Director, presented the Risk Management Division Update, included on pages 7-14 in the meeting materials. Mr. Nair gave an update on several items, including SWIB's Counterparty Consultative Group, the Critical Spreadsheets and Applications Policy, counterparty monitoring, and business continuity. With respect to the Counterparty Consultative Group, Mr. Nair outlined the key responsibilities of the group, which is tasked with managing SWIB's counterparty exposures.

Mr. Nair then reviewed efforts made under the Critical Spreadsheets and Applications Policy. SWIB staff identified 134 spreadsheets, with 116 being deemed critical. Mr. Nair has also engaged with Internal Audit to review the list. This review is Phase 1 of an overall larger risk program, with Phase 2 being the implementation of agency wide control measures. Eventually, Phase 3 will include oversight of the contents of the models.

Mr. Nair briefly discussed counterparty monitoring, which is waiting for resource availability from the data management and technology groups to pursue a consolidated view of counterparty exposures. There was a discussion of potential interim steps pending the launch of this project.

Finally, Mr. Nair gave an update on the Department of Administration's ("DOA") centralized repository for business continuity. The DOA noted that SWIB did not need to do anything related to this in 2022.

3. Compliance Update

Lisa Lange, Director of Compliance and Senior Legal Counsel, presented the *Compliance Reporting & Updates* for Q2 2022 and Q3 2023, which were included on pages 15-30 in the meeting materials. Ms. Lange first introduced two new members of the Compliance team, Jason Krueger and Trey Edgerle, with twenty and nine years of experience, respectively, in the industry.

A. Q2 2022

Ms. Lange reported that the second quarter of 2022 had fewer trade requests than the prior corresponding quarter but was generally in line with recent quarters. There were two personal trading violations in the quarter, both deemed minor and by individuals no longer with SWIB. There were no guideline violations or waivers granted. Ms. Lange also reported four individuals with a late compliance affirmations.

B. Q3 2022

Ms. Lange noted that third quarter of 2022 saw significantly fewer personal trading requests than the prior quarter, with a lower approval rate. There were no personal trading violations in the third quarter. There were five employees with late compliance affirmations. Ms. Lange noted no guideline violations and two waivers granted. The High Yield Portfolio was granted a temporary waiver allowing the tracking error to be increased from 5% to 6.5%. This waiver was extended through December 31, 2022. Second, the MBS Portfolio was granted a waiver for the 25% limit on low-duration fixed-income securities and the 3% collateralized loan obligation ("CLO") limit. The waiver increased the CLO limit to 15%. The waiver is in place until MBS guidelines can be revised at a future Investment Committee meeting.

In conclusion, Ms. Lange briefly discussed SWIB's annual staff compliance training and Compliance's role in the Critical Spreadsheets and Application Policy previously discussed by Mr. Nair. She noted that completion of Phase I of the implementation of the Critical Spreadsheets and Application Policy, including identification of the critical spreadsheet inventory along with manager affirmations, was a significant accomplishment for SWIB.

4. ERCC Charter Review

Sara Chandler, Chief Legal Counsel, reviewed the Enterprise Risk and Compliance Committee Charter, included on pages 31-33 in the meeting materials. She noted that this is an annual review of the charter and that there were no recommended changes.

5. Convene in Closed Session

Motion: A motion to go into closed session pursuant to section 19.85(1)(d) of the Wisconsin Statutes to consider confidential strategies for crime detection and prevention relating to SWIB's information technology systems and pursuant to sections 19.85(1)(e) and 19.36(5) of the Wisconsin Statutes to consider confidential strategies for the investment of public funds, including the review of proprietary credit counterparty and broker information, was made by Mr. Greenfield and seconded by Ms. Chandler.

Ms. Lange called for a roll call vote.

Chandler-Aye	Denson-Aye	Greenfield-Aye	Heimsoth-Aye
Jacobs-Aye	Klaskin-Aye	Lange-Aye	

There being seven ayes and no nays, Ms. Lange declared the motion passed. The Committee convened in closed session at 11:44 a.m. and reconvened in open session at 12:17 p.m.

6. Announcement of Matters Taken Up in Closed Session

Ms. Lange announced that, while in closed session, the Committee approved prior meeting minutes and received an update on operational risk management.

7. Future Meeting Topics

No future meeting topics were discussed.

8. Adjournment

Motion: A motion to adjourn was made by Ms. Chandler and seconded by Mr. Jacobs. The motion passed unanimously, and the ERCC meeting was adjourned at 12:18 p.m.

Date of Committee Approval: ____________________________

Signed: ____

Sara Chandler, Secretary
Enterprise Risk and Compliance Committee

Board Meeting

Tab 10 – Quarterly Investment Update, Q4 2022

SWIB

Quarterly Investment Update

Board Meeting

March 29, 2023

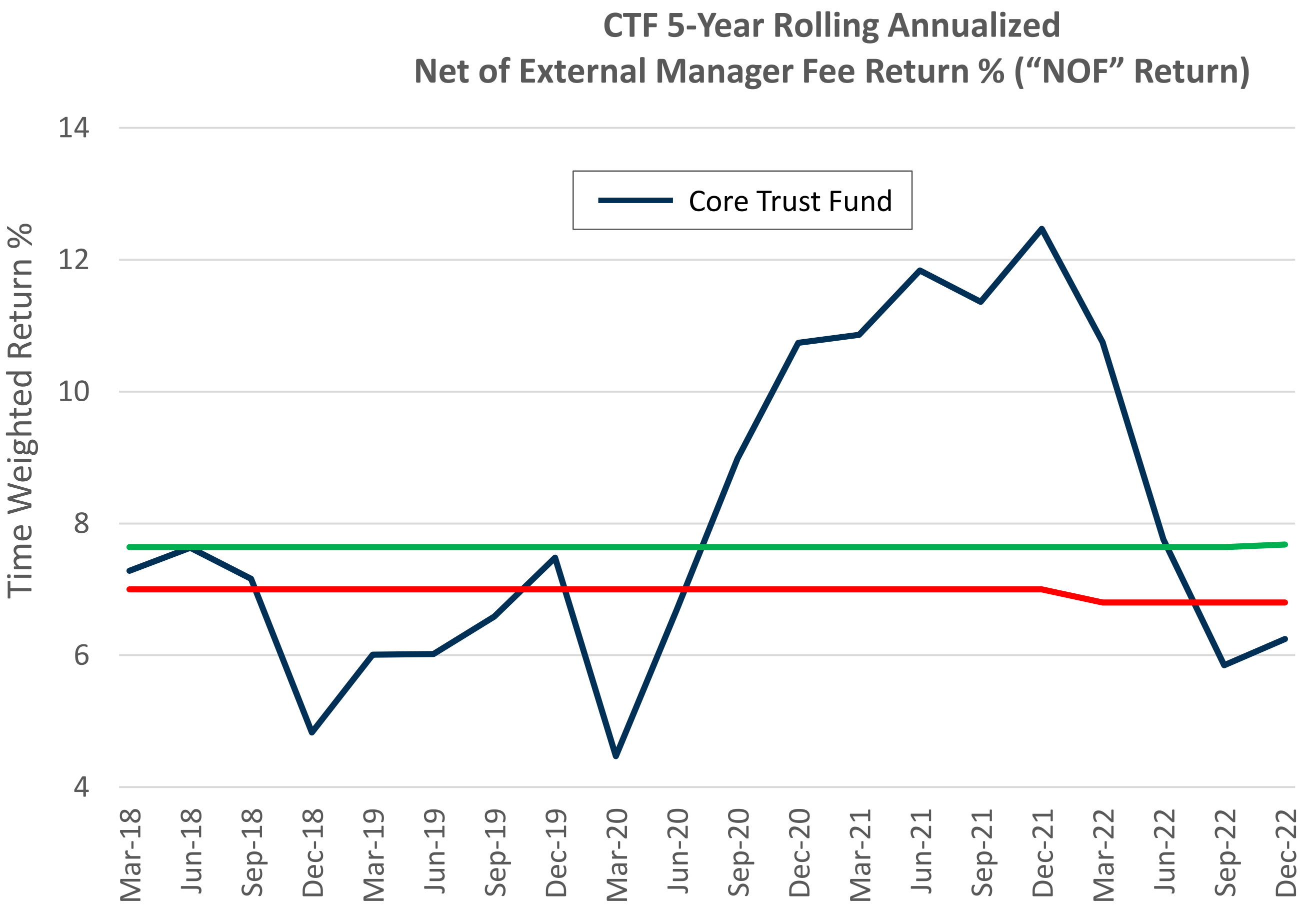
STATE OF WISCONSIN INVESTMENT BOARD

Performance Trends & Outlook

STATE OF WISCONSIN INVESTMENT BOARD

CTF 5-Year Rolling Return Trend

Quarter-end Results Through December 31, 2022



5-Year Annualized NOF Return (as of December 31, 2022)	
6.25%	Core Trust Fund
5.68%	CTF Policy Benchmark

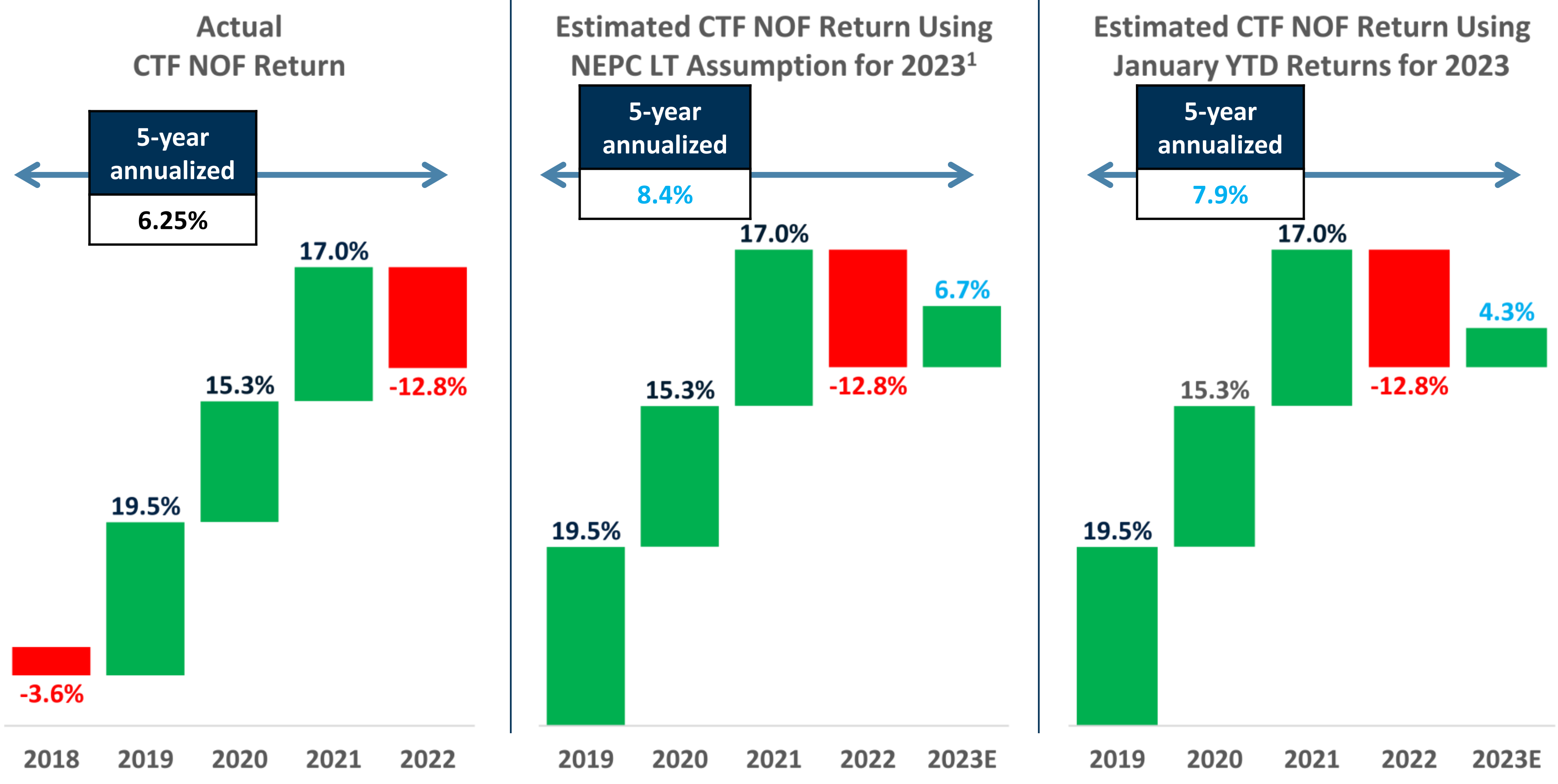
7.68%
CTF 20-year NOF Return

6.8%
Actuarial Target Rate of Return

SWIB
STATE OF WISCONSIN
INVESTMENT BOARD

CTF 5-year Return Estimate

Calendar year and 5-year annualized returns



[1] The NEPC 10-year expected return assumption is used to estimate 2023

CTF Policy Benchmark & Other Indices

Equity and Fixed Income asset classes declined severely last year

January 31, 2023: Total Rate of Return %, Annualized					
Index Name (Gross Return Basis, unless noted)	**YTD**	**1yr**	**5yr**	**10yr**	**10yr volatility**
CTF Policy Benchmark (Gross)	4.3	(5.9)	6.2	7.2	8.5
MSCI USA	6.6	(9.0)	9.5	12.6	15.0
MSCI USA Small Cap	10.4	(0.6)	7.7	10.9	18.6
MSCI World ex US Equities	8.2	(3.0)	2.5	4.9	14.9
MSCI World ex US Equities (Local)	6.4	2.3	5.1	7.6	12.3
MSCI EAFE Small Cap	7.5	(8.4)	0.8	6.8	16.2
MSCI Emerging Markets ex China	6.1	(12.7)	0.7		
MSCI China	11.8	(9.9)	(4.5)	3.4	22.9
MSCI ACWI	7.2	(7.5)	6.1	8.8	14.4
MSCI ACWI (Local)	6.5	(5.8)	7.2	10.1	13.2
Bloomberg US Gov't / Credit	3.0	(8.7)	1.0	1.5	4.6
ICE BOFA High Yield BB/B	3.6	(4.6)	3.0	4.2	7.2
Bloomberg U.S. TIPs	1.8	(8.4)	2.7	1.4	5.2

Source: Factset, SWIB

SWIB
STATE OF WISCONSIN INVESTMENT BOARD

Economic Update

Summary

Growth

- GDP growth has slowed after a strong post-COVID rebound and as consequence of 450 basis points of rate hikes by the Fed over the past year.
- Despite large and rapid Fed rate hikes, the economy has been resilient, skirting recession thus far.
- The labor market remains tight, with solid jobs growth and strong nominal wage growth.
- Consumer balance sheets are in good shape. Household holdings of liquid assets are still elevated, a consequence of sizeable government pandemic stimulus and depressed spending on discretionary services during 2020-22.

Inflation

- The bad news: inflation is still too high, with core PCE measures in a 4% to 5% range in recent months, well above the Fed's 2% target.
- Goods inflation has eased sharply as supply chain issues are resolved.
- However, services inflation ex housing is running at rates last seen in the late 1980's. Housing inflation (rent and owner-equivalent rent) is running at a Volcker-era rate of 8%.

Outlook

- While it's good news that the economy has avoided recession thus far, it's hard to see inflation normalizing back to the 2% Fed target without at least a mild recession that brings demand and supply into closer alignment.
- The recent failures of Silicon Valley Bank and Signature Bank have complicated the Fed's job.
- Joint action by Treasury, FDIC, and the Fed to

  (i) guarantee all depositors in the failed banks

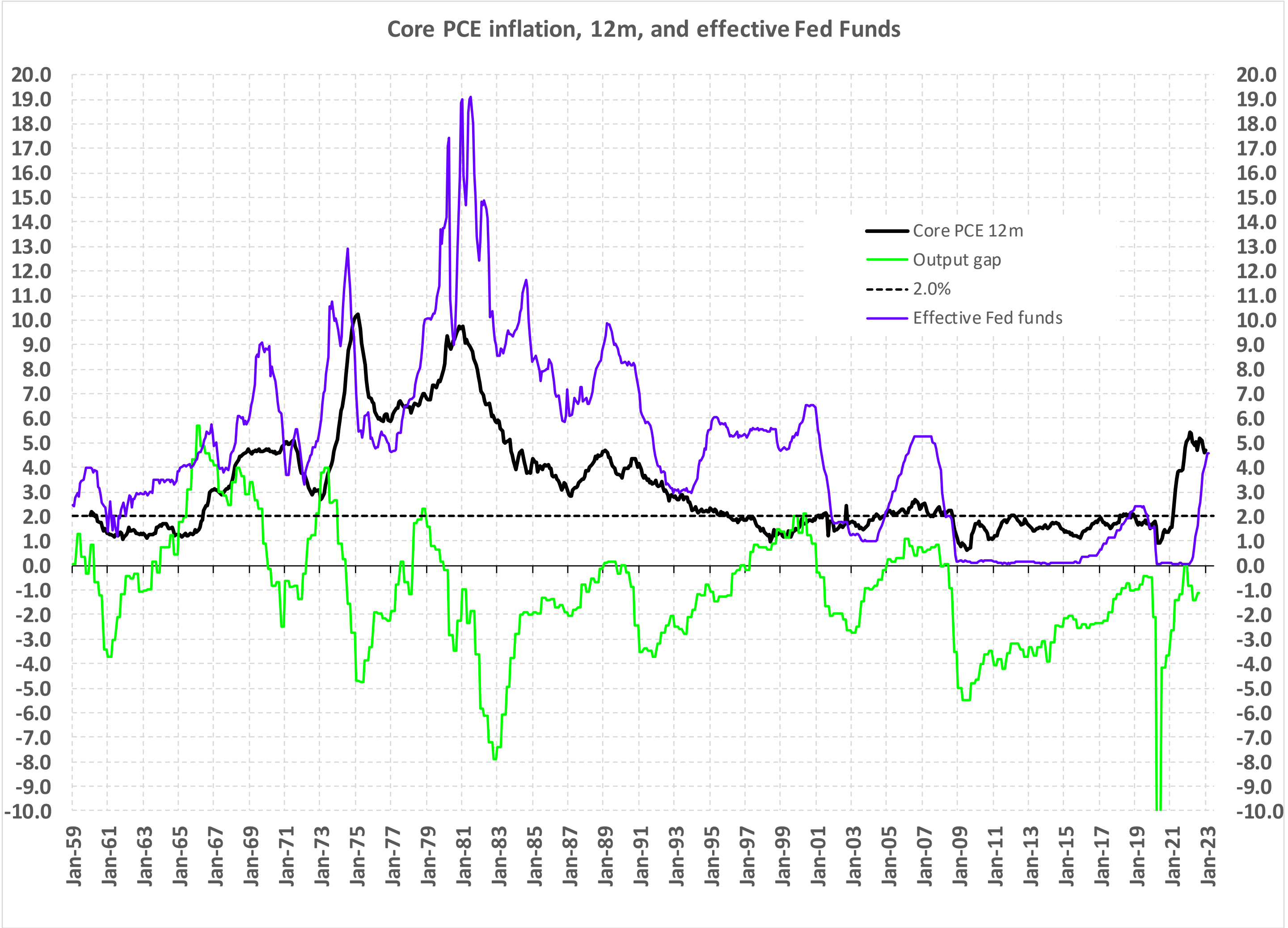
  (ii) provide Fed liquidity to other banks that might see funding problems

  should go a long way towards stabilizing the banking sector.
- The Fed might well pause rate hikes at its 22-Mar decision, or at most deliver a modest +25 bps hike. Although inflation is too high, financial stability concerns are likely to trump until the full degree of banking sector fallout becomes more clear.
- But if financial sector stress remains contained, growth relatively strong, and inflation sticky, the Fed will have to resume tightening. Peak Fed funds of 5.0% or more remains plausible. Markets don't currently envision this scenario, and price fairly rapid rate cuts over the course of this year.

SWIB STATE OF WISCONSIN INVESTMENT BOARD

Inflation & Growth Outlook

Inflation has peaked, but is far above the Fed's 2.0% target



- Significant disinflations always involve central bank tightening.
- Higher interest rates moderate demand growth in the economy to below the "potential" or supply-side rate of economic growth (the rate consistent with not straining supplies of labor and capital).
- The green "output gap" at left captures periods where demand outruns supply (positive) and where demand growth is below supply growth (negative).
- Notable periods of negative output gaps are the Volcker disinflation of '81-'83, the recessions of '91 and '01, and the global financial crisis of '08-'09.
- The Fed is intent on lowering inflation from its current unacceptably high rate.
- This will require slowing demand growth and creating a negative output gap.
- After a year of Fed tightening, the *ex post* real Fed Funds rate is back near 0%. It may need to go positive for a while.

SWIB forecast is for moderating inflation, but at a slower pace than consensus or last FOMC outlook ("SEP")

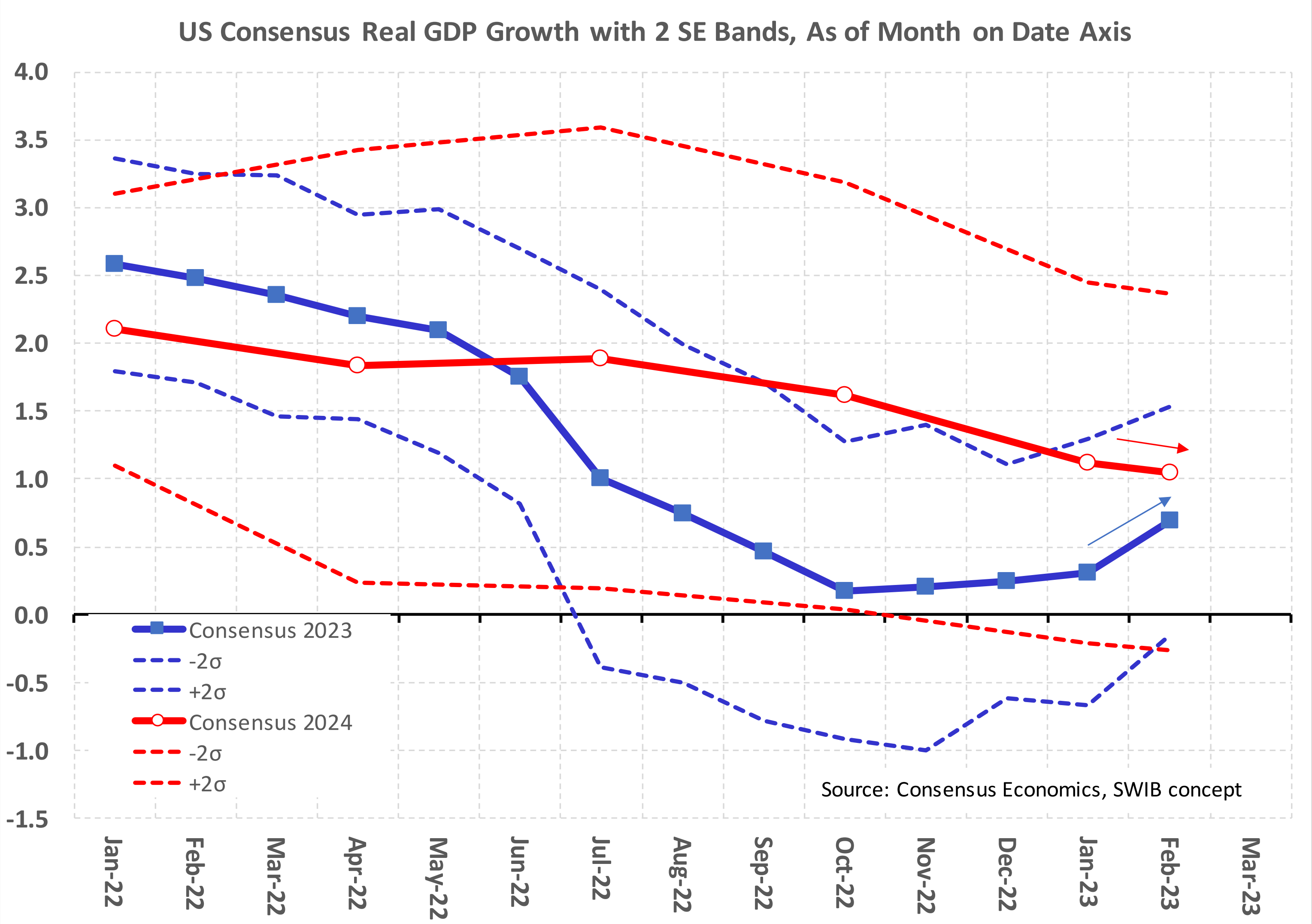
Core PCE Outlook		Y/Y Actual			Y/Y Forecast			Contribs to change				
	Wgt	Sep-22	Dec-22	Jan-23	Dec-23	Dec-24	Dec-25	Dec-22	Jan-23	Dec-23	Dec-24	Dec-25
Core PCE	**100.0%**	**5.2**	**4.6**	**4.7**	**3.7**	**2.9**	**2.5**	**-0.60**	**0.10**	**-0.97**	**-0.82**	**-0.38**
New motor vehicles	2.4%	9.3	7.4	7.5	5.5	3.5	3.0	-0.05	0.00	-0.05	-0.05	-0.01
Used motor vehicles	1.6%	7.1	-6.7	-9.9	-1.0	1.0	1.0	-0.23	-0.05	0.14	0.03	0.00
Other durable goods	10.2%	4.6	2.1	2.0	3.0	2.5	2.0	-0.26	-0.08	0.18	-0.05	-0.05
Core nondurables	13.0%	5.7	4.9	4.7	3.5	2.0	2.0	-0.11	-0.02	-0.16	-0.19	0.00
Housing	16.8%	6.8	7.7	8.0	6.5	5.3	3.5	0.16	0.04	-0.25	-0.20	-0.30
Core utilities	0.8%	4.9	5.1	5.0	4.0	3.5	3.5	0.00	0.00	-0.01	0.00	0.00
Health care	17.8%	2.5	2.5	2.1	2.5	2.5	2.5	0.00	-0.07	0.07	0.00	0.00
Motor vehicle rental	0.2%	-1.4	-1.1	9.6	0.0	1.0	2.0	0.00	0.60	-0.60	0.00	0.00
Air transportation	1.0%	33.1	18.4	28.6	12.0	3.5	2.5	-0.13	0.11	-0.17	-0.09	-0.01
Other transp services	2.4%	11.0	12.3	11.7	3.0	2.5	2.5	0.03	-0.01	-0.21	-0.01	0.00
Food services	7.0%	7.9	7.5	7.5	5.0	3.0	3.0	-0.02	0.00	-0.17	-0.14	0.00
Accommodation	1.2%	3.0	1.7	6.4	3.5	2.5	2.0	-0.02	0.06	-0.04	-0.01	-0.01
Education services	2.1%	2.3	2.5	2.7	2.2	2.2	2.2	0.00	0.00	-0.01	0.00	0.00
Financial & insurance	8.6%	0.2	0.4	0.6	2.0	2.5	2.5	0.02	0.02	0.12	0.04	0.00
Other household svcs	11.4%	4.5	5.0	0.3	3.0	2.2	2.2	0.06	-0.53	0.31	-0.09	0.00
Non-profit consumption	3.5%	9.9	7.6	9.8	4.0	2.5	2.5	-0.08	0.08	-0.20	-0.05	0.00

Core PCE forecasts	Sep-22	Dec-22	Jan-23	Dec-23	Dec-24	Dec-25
SWIB	**5.2**	**4.6**	**4.7**	**3.7**	**2.9**	**2.5**
FOMC SEP 14-Dec-22	**5.2**	**4.6**	**4.7**	**3.5**	**2.5**	**2.1**
BBG Consensus 2-Mar-23	**5.2**	**4.6**	**4.7**	**3.0**	**--**	**--**

Source: SWIB forecast, BEA historical data

STATE OF WISCONSIN INVESTMENT BOARD

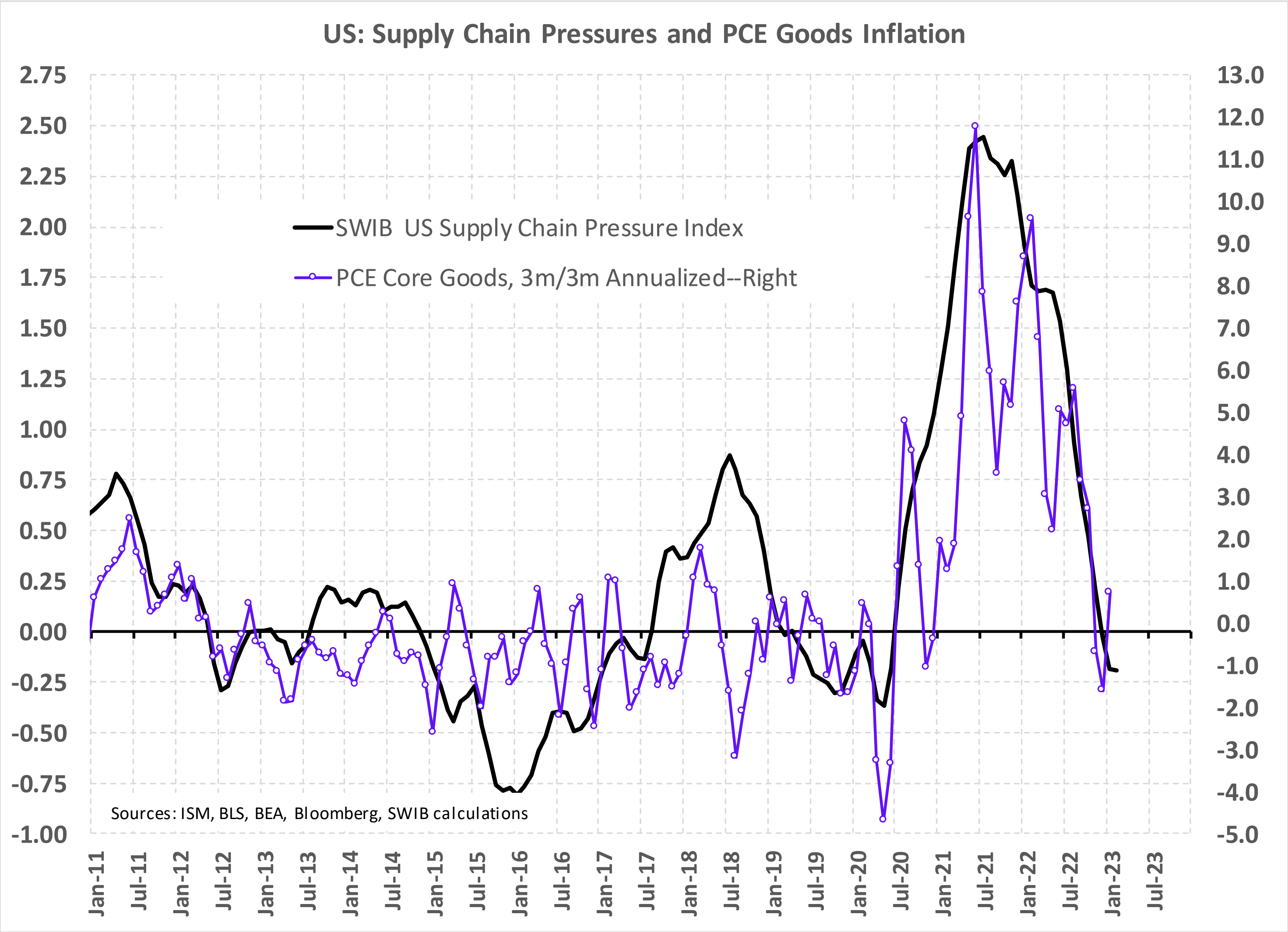
Consensus growth for 2023 edges up, 2024 downgrading continues



- Economist consensus sees serious recession as a tail risk.
- The mean forecast is for a "soft landing" of a sort: two years of below-trend growth: 2023 +0.7%, 2024 +1.1% on an annual average basis.
- Which doesn't rule out a couple of quarters of modest GDP contraction.
- Note that this consensus was formed before the recent banking sector turmoil, which could lead to lower growth expectations.

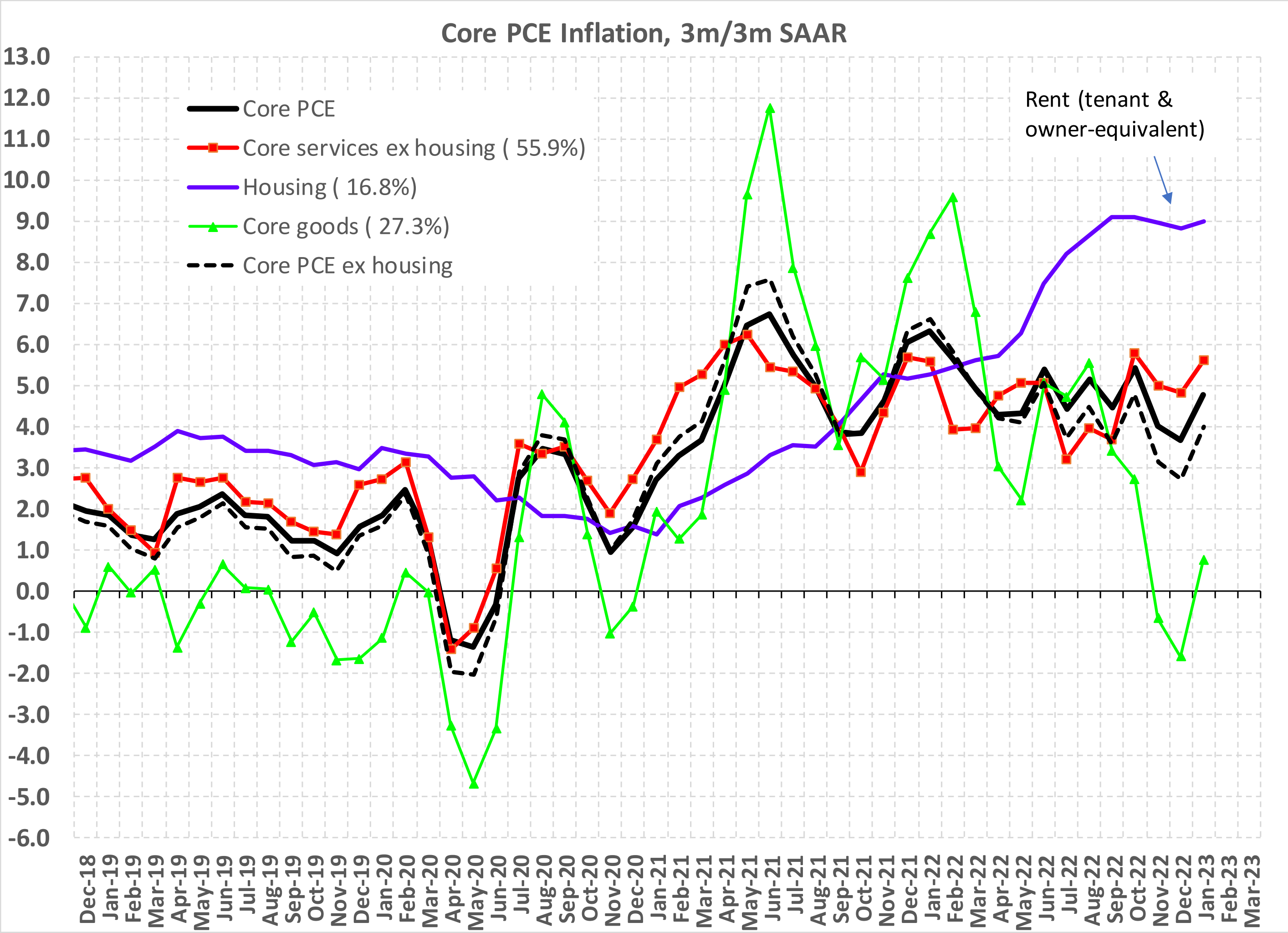
SWIB
STATE OF WISCONSIN INVESTMENT BOARD

Supply-chain pressures, goods price inflation have eased—but how long can goods disinflation last?



STATE OF WISCONSIN INVESTMENT BOARD

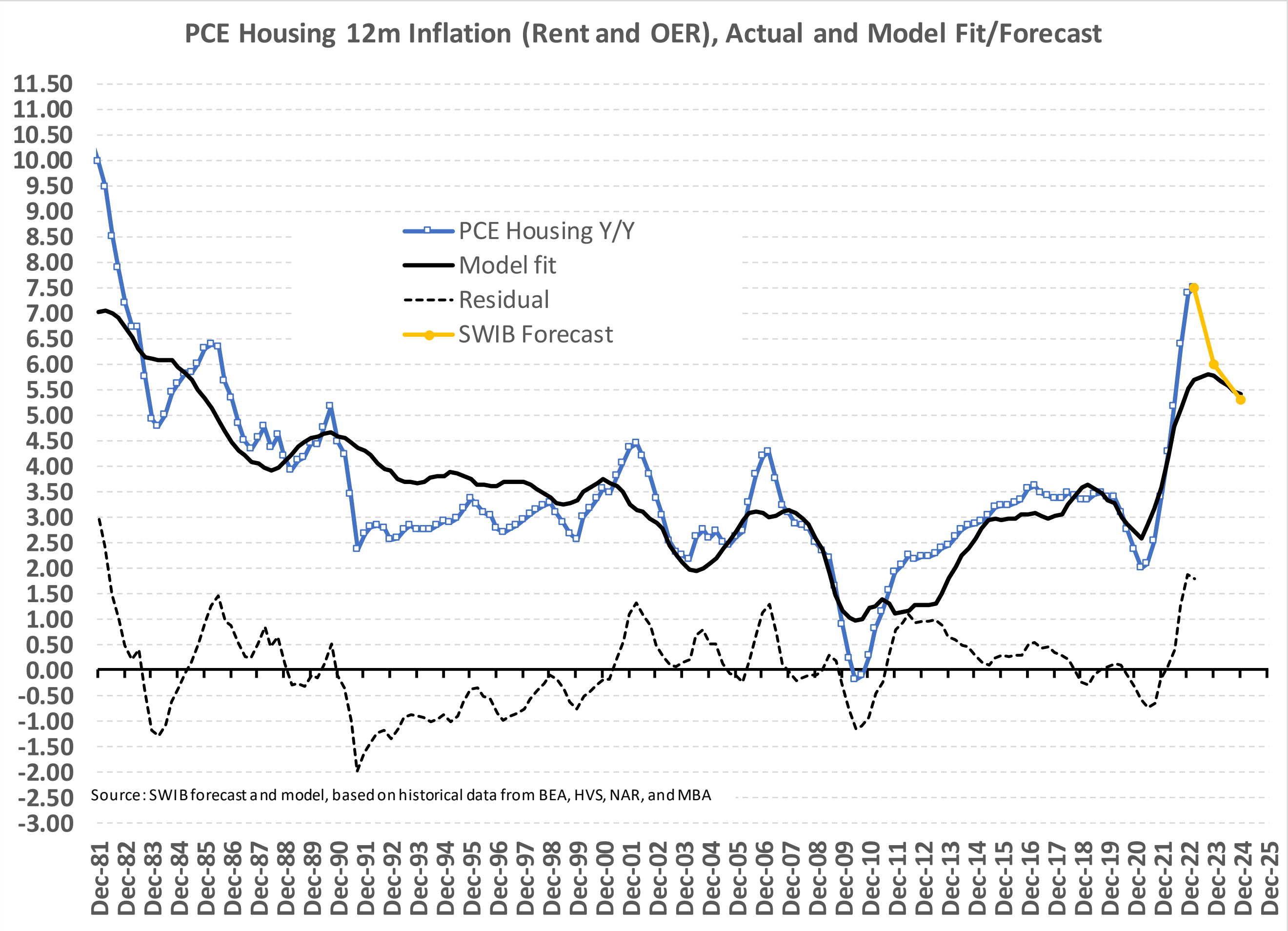
While goods inflation has eased, other measures are worryingly high



- Services ex housing are labor-intensive and the majority of personal consumption.
- On this measure inflation remains worryingly high, reflecting a still-strong labor market and nominal wage pressures.
- Housing inflation (tenant rent, owner-equivalent rent) is at a 40-year high.
- Overall, core at 4.7% annualized and "supercore" (ex housing) at 4.0% are still far north of 2.0% Fed target.
- Supercore had been trending down, falling well below 3.0% in Dec, but saw a Jan rebound.

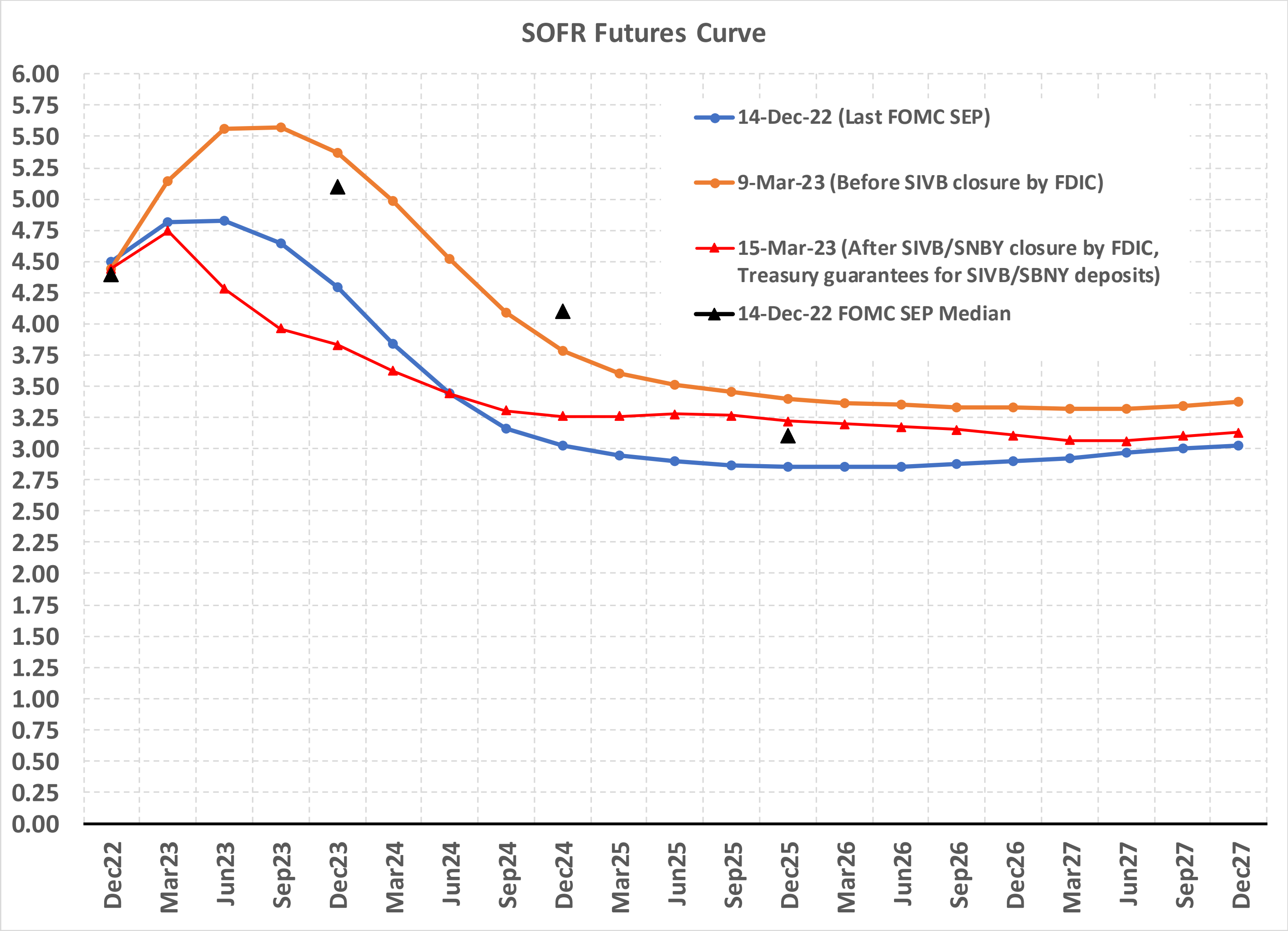
Rent inflation is high, and likely to stay high in the next two years

- Rental inflation pickup has been sharp.
- High-priced housing is unaffordable for many potential buyers, forcing them to rent.
- The rental vacancy rate is at a 40-year low.
- However, a period of slower house price appreciation is ahead, with outright declines quite possible.
- Improved housing affordability should help cap rental inflation. This process will take time, and lower mortgage rates need to be part of the adjustment.



SWIB STATE OF WISCONSIN INVESTMENT BOARD

Market *was* pricing a more hawkish Fed than was the case 14-Dec-2022 (last FOMC outlook or "SEP") But recent Silicon Valley Bank & Signature Bank events have brought the market back to Dec-22 levels.

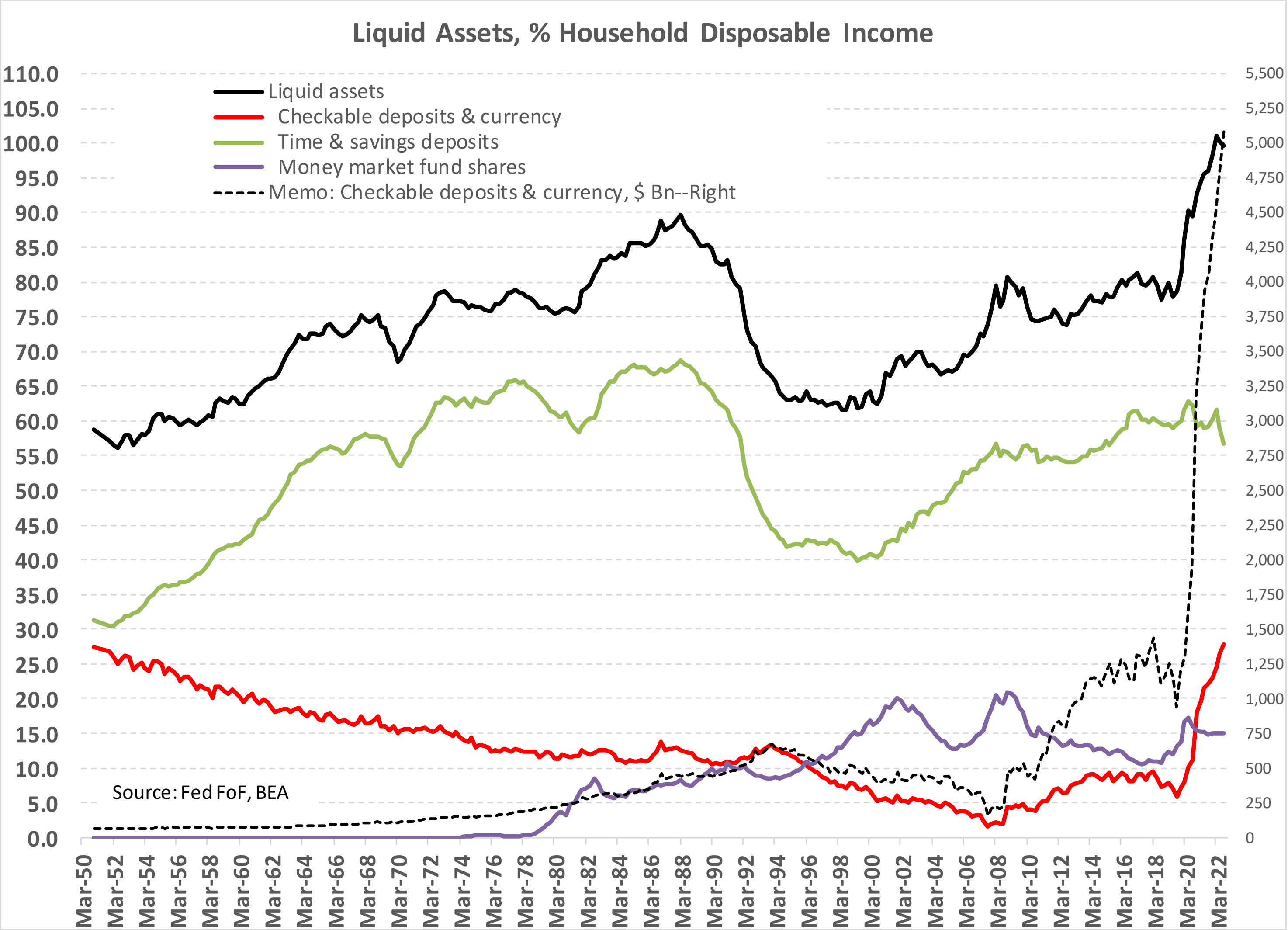


Next Fed decision (and new SEP) comes on 22-Mar.

SWIB STATE OF WISCONSIN INVESTMENT BOARD

High savings rates and pandemic relief payments have left households with lots of liquid assets

About $5 trillion sitting in checking accounts & currency—a decent cushion for whatever lies ahead

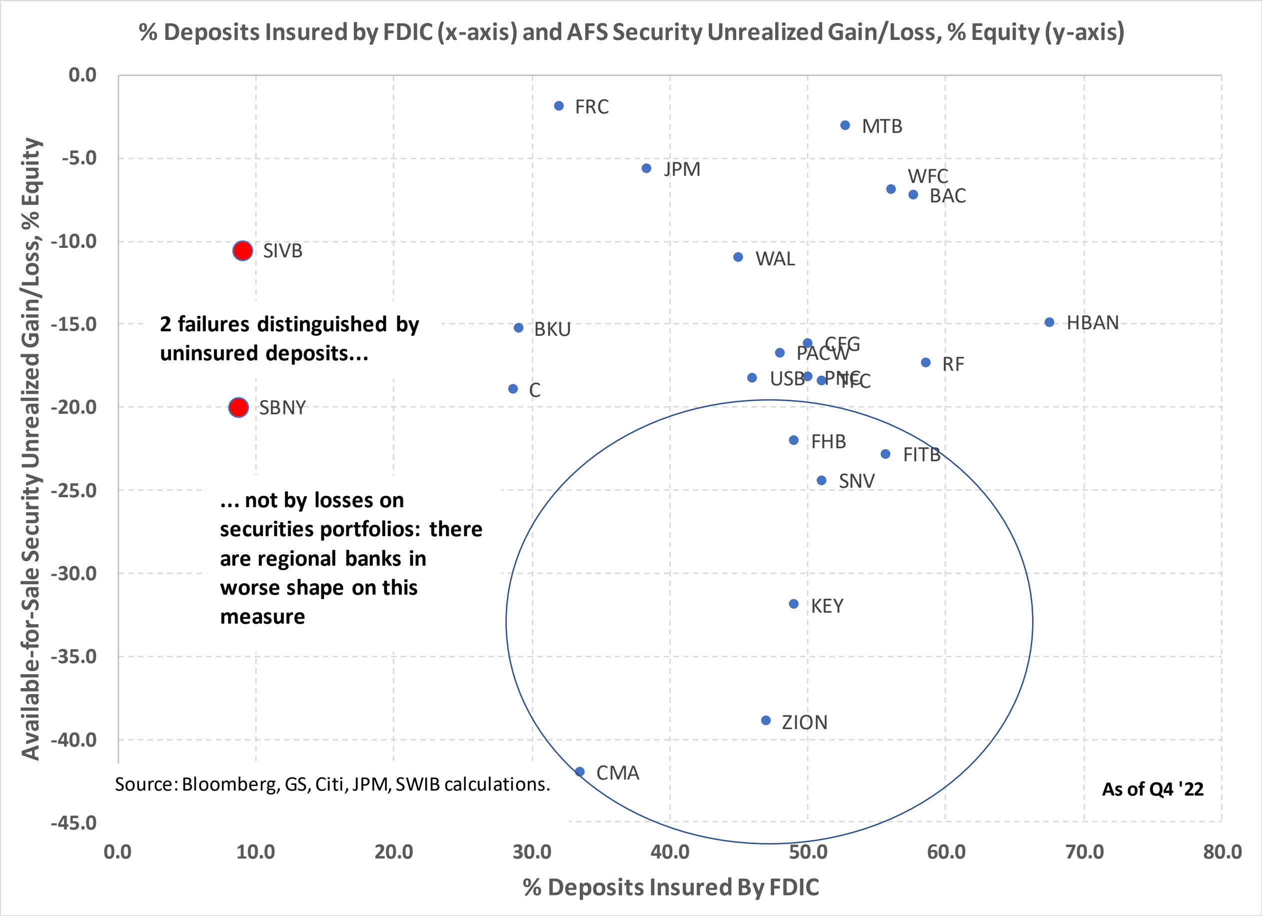


STATE OF WISCONSIN INVESTMENT BOARD

Bank Stress

Silicon Valley Bank and Signature Bank of New York had a very low ratio of insured-to-total deposits

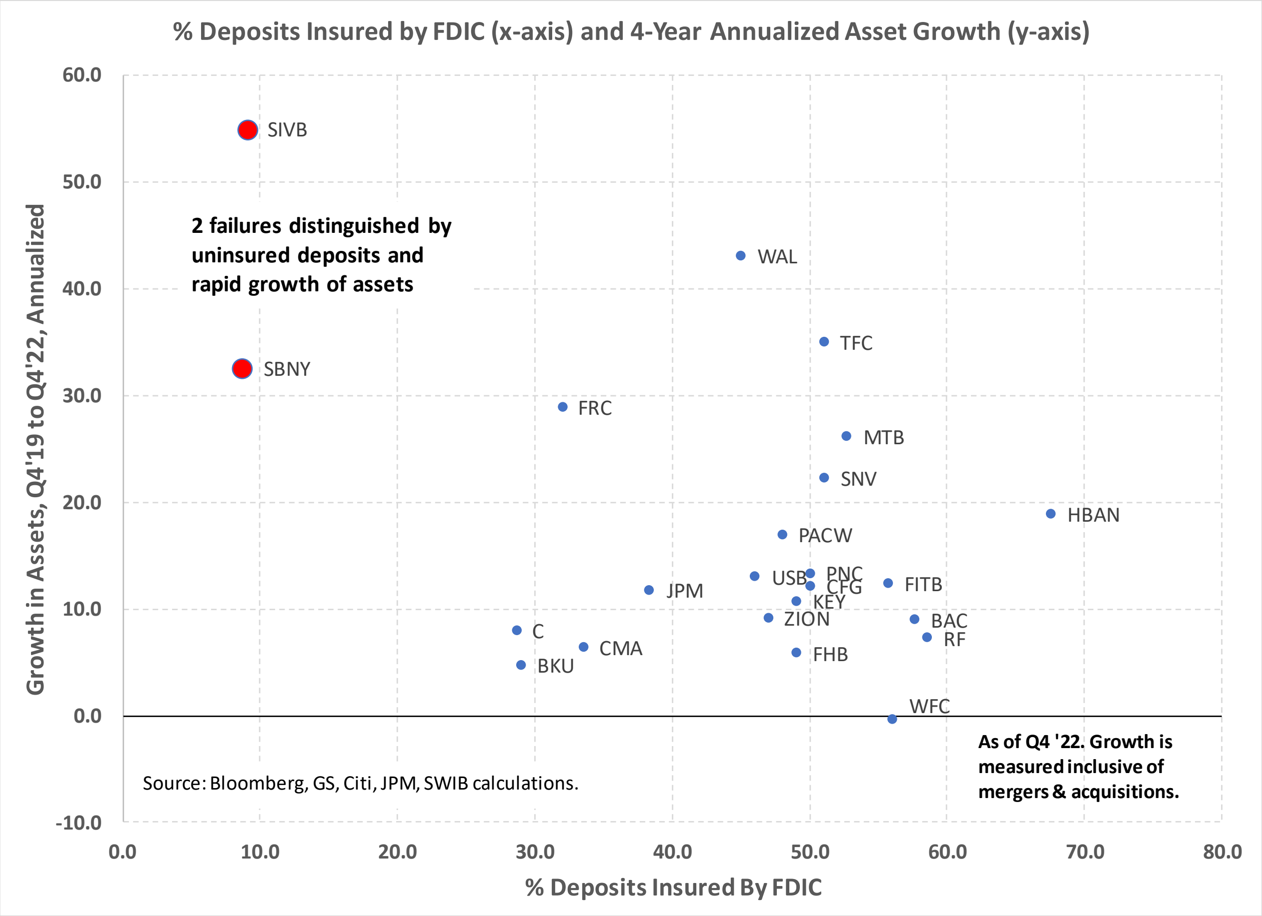
Both are banks for businesses, with SIVB specializing in banking for startup firms: not much retail business, hence not many deposits under the $250k FDIC insurance cap



- The Fed has raised rates substantially over the past year, after a thirteen-year period of easy policy…
- …causing losses on securities held available-for-sale at banks
- These AFS losses have been most severe among some regional banks.
- AFS losses were not especially severe at Silicon Valley Bank (SIVB) and Signature Bank of New York (SBNY), the two recently failed banks.
- A very low level of insured deposits distinguishes SIVB and SBNY.
- Security losses likely played a contributing role in starting the deposit runs on these two banks.
- But the uninsured nature of the deposits was arguably decisive.
- Both banks can also be characterized by lack of geographical diversity among their depositors: startup firms and VC's in California and New York (SIVB), small businesses in the New York metro area, with some more recent diversification to California (SBNY).
- Close-knit business communities talk and share ideas. This is their strength. However, in this case, idea-sharing appears to have galvanized deposit runs on two previously-favored banks.

SWIB STATE OF WISCONSIN INVESTMENT BOARD

Silicon Valley Bank and Signature Bank of New York grew quickly over the last four years



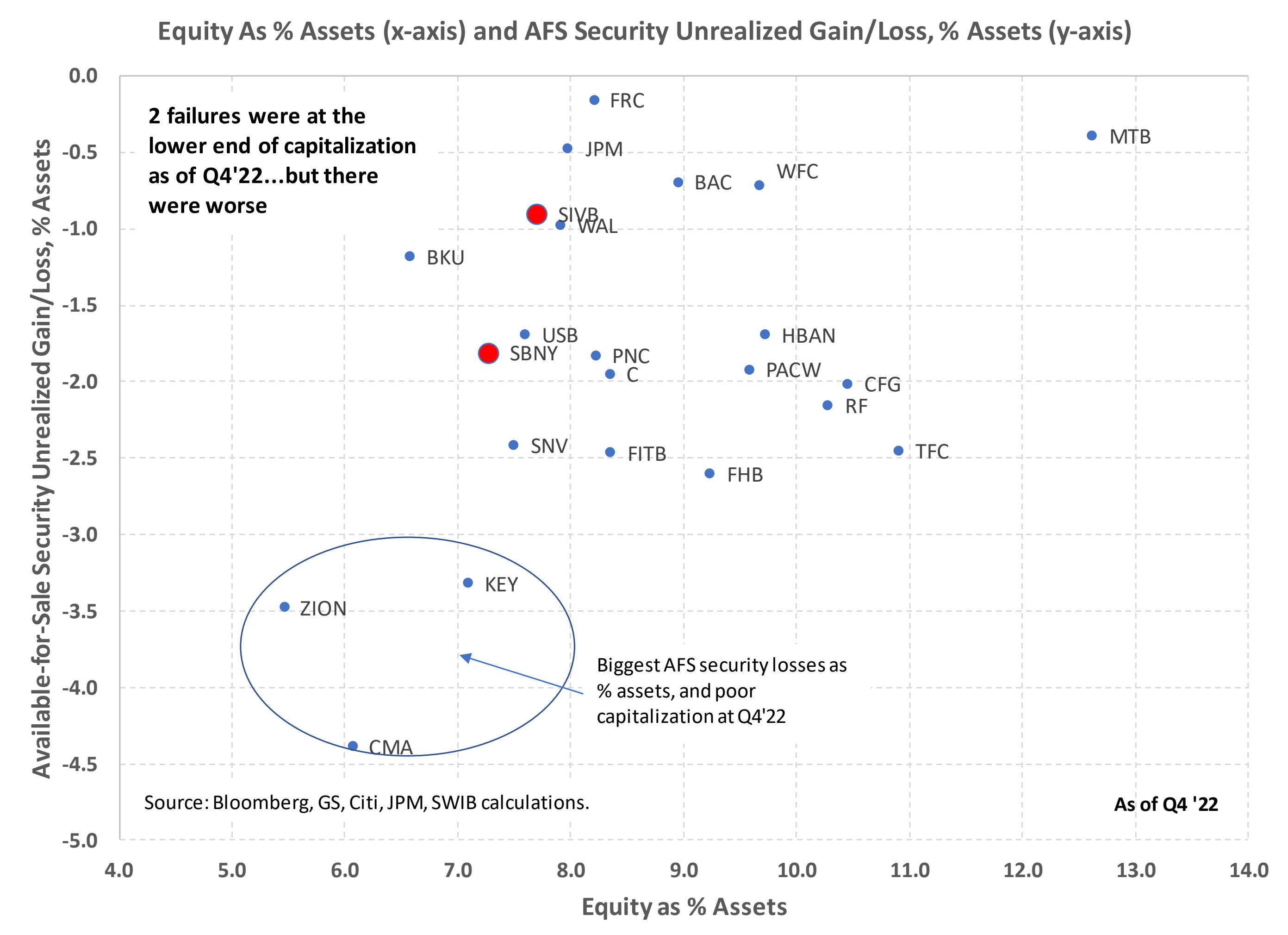
- By 2018, bipartisan consensus had built that the Dodd-Frank banking regulations were perhaps too onerous, particularly for regional banks that were arguably not systemically important.
- New legislation raised the asset level for a bank to be considered systemically important to $250 bn from $50 bn.
- SIVB and SBNY were among the banks that took advantage of regulatory relief, growing assets quickly since 2018:

  SIVB: $57 bn of assets Q4’18, $212 bn Q4’22
  SBNY: $47 bn of assets Q4’18, $110 bn Q4’22
- While not always a bad thing, too-fast-growth can be at least *prima facie* evidence of growth with excessive risk-taking.

SWIB
STATE OF WISCONSIN INVESTMENT BOARD

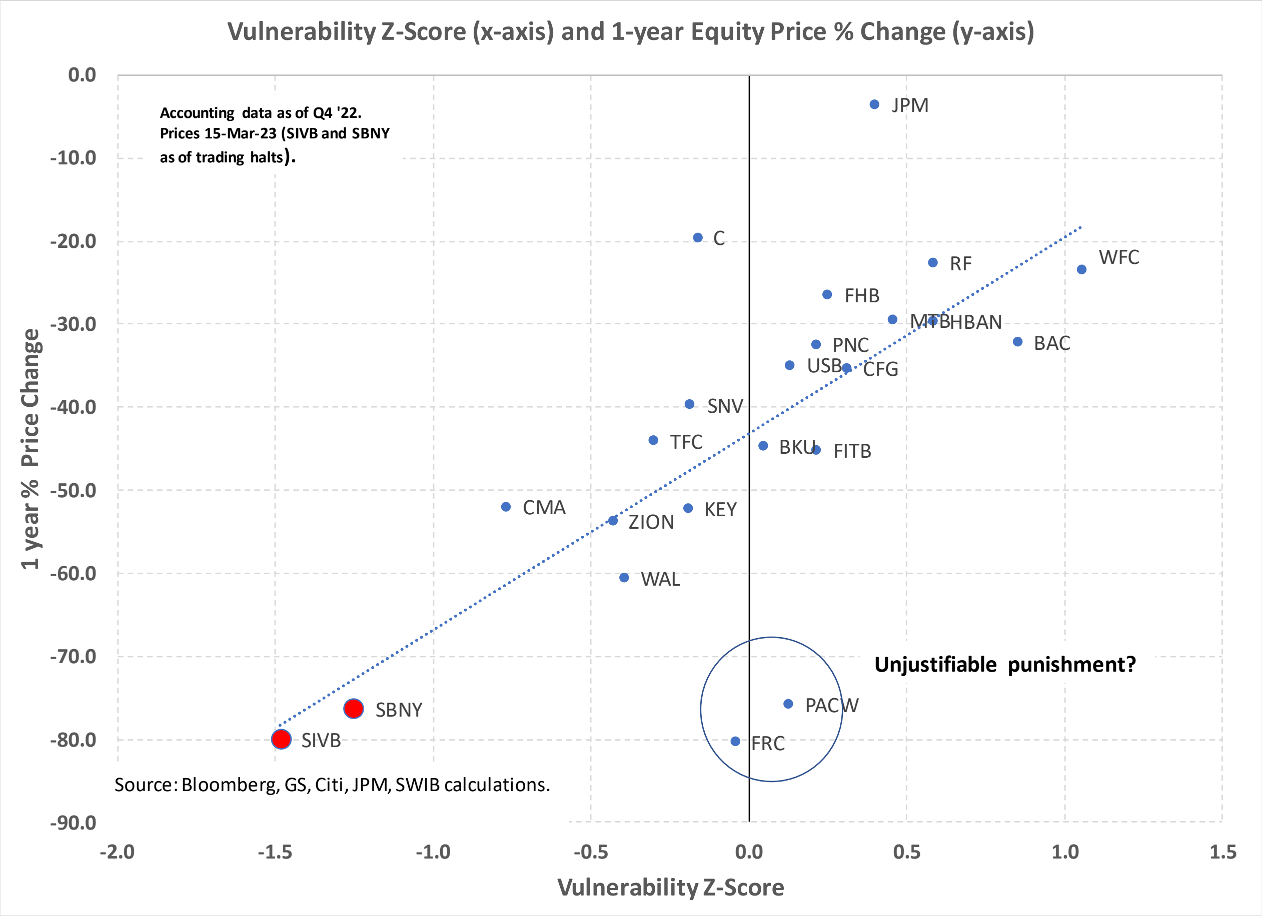
On a simple equity/asset ratio, SIVB and SBNY were relatively under-capitalized at the end of last year

ZION, KEY, and CMA were in an even weaker capital position, however, due to relatively large losses on AFS securities portfolios.



SWIB STATE OF WISCONSIN INVESTMENT BOARD

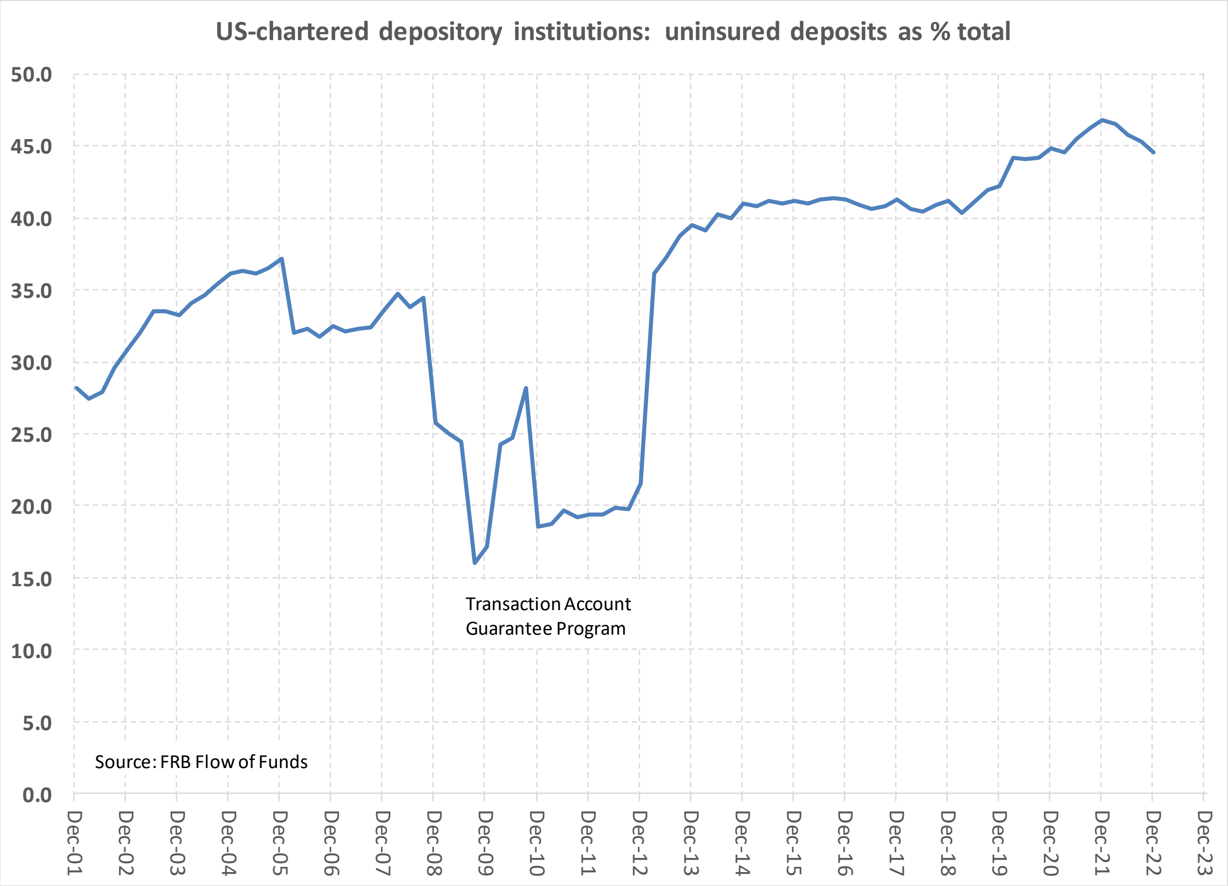
A several-factor look at what drove declining equity prices



- Vulnerability indicator is the equally-weighted average of three cross-section Z-scores:
  - --Level of insured deposits
  - --4-year growth of assets
  - --Losses on AFS security portfolios
- This simple indicator does a reasonable job of explaining stock price % changes over the last year

SWIB
STATE OF WISCONSIN INVESTMENT BOARD

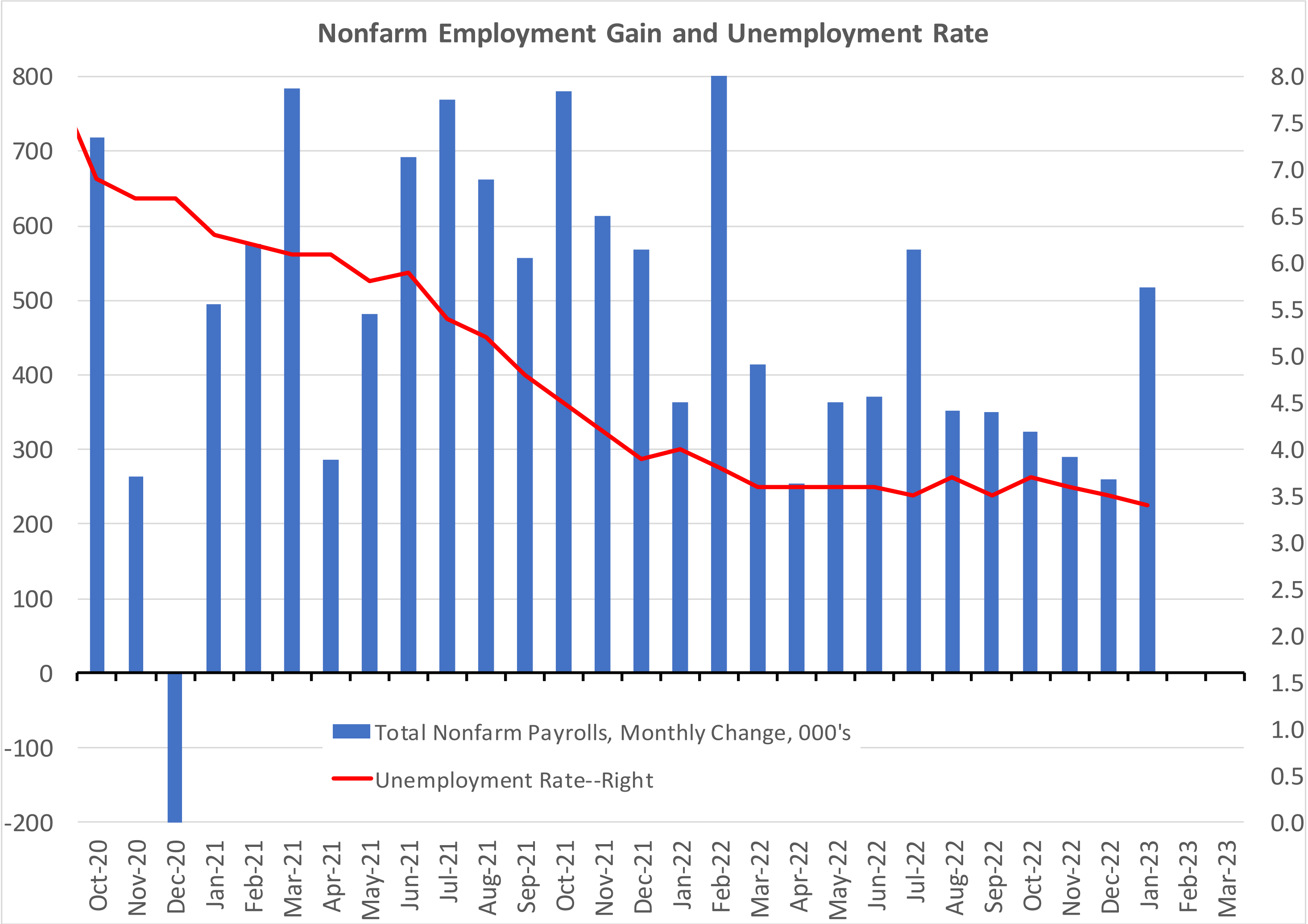
Retroactively guaranteeing non-insured depositors has precedent: Transaction Account Guarantee Program (TAGP) 2008-12



- The TAGP was an innovation of the global financial crisis. It guaranteed noninterest-bearing transaction accounts in excess of the FDIC maximum until 2010, and was later extended, ending during 2013.
- The rationale was to provide large business depositors protection of their working assets (payroll, input costs, and so forth), in order to avoid deposit runs and to keep businesses running smoothly.
- The rationale in the SIVB and SBNY case was no doubt similar—prevent deposit contagion from spreading further, and allow startup firms to meet payrolls and other short-term needs.
- The swift action by FDIC, Fed, and Treasury was arguably the right thing to do in this moment, but will no doubt bring renewed and legitimate political discussion regarding moral hazard and its consequences for future risk-taking by banks.
- Expect discussion as well on undoing the 2018 undoing of Dodd-Frank regulations.

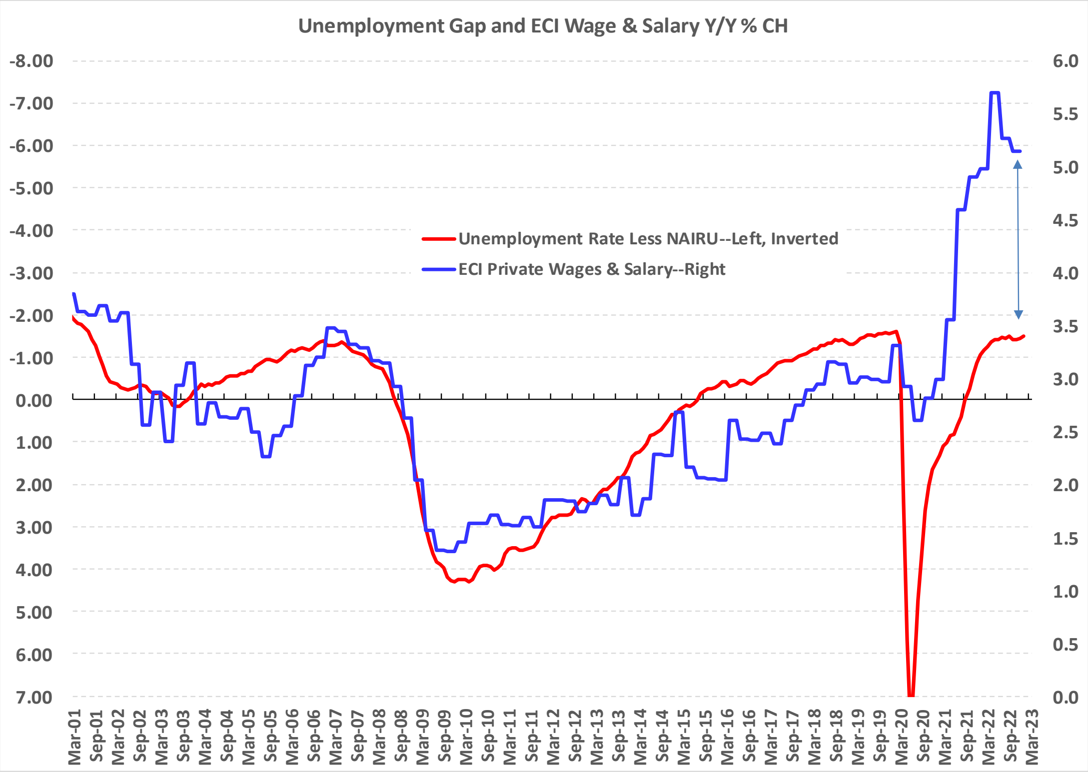
Labor Market

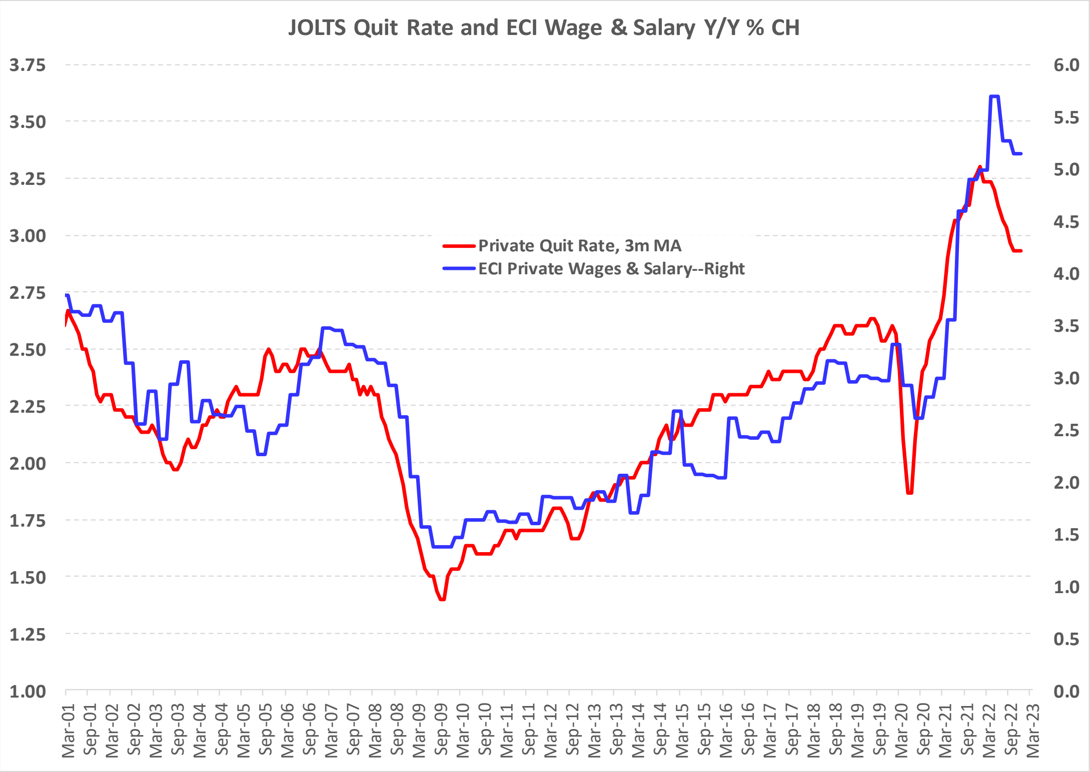
The labor market remains tight: it's hard to say we're (already) in recession given slowing but still sizeable employment gains and a low unemployment rate



STATE OF WISCONSIN INVESTMENT BOARD

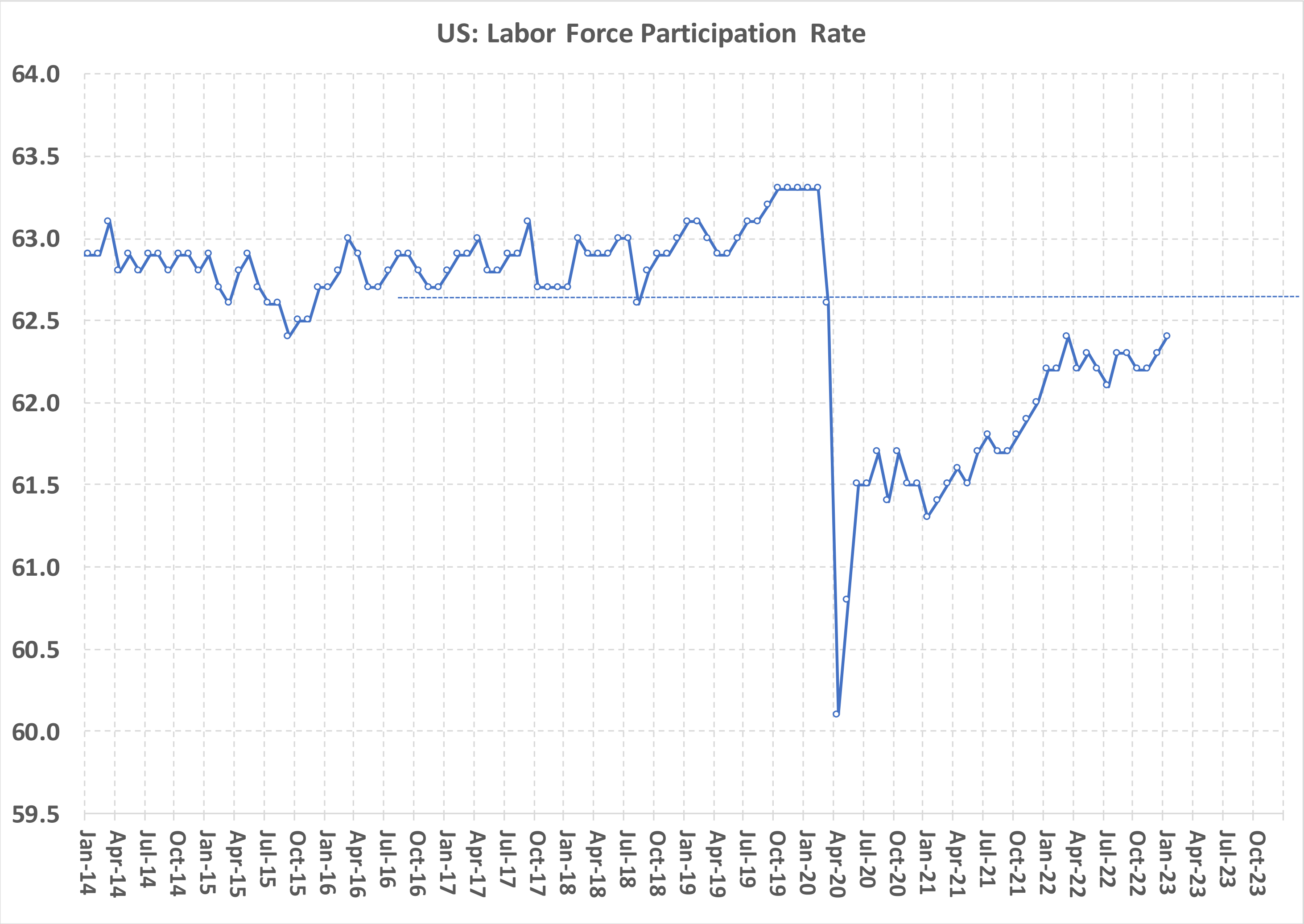
Traditional wage Phillips curve can’t explain current high wage inflation.
Quit rate the better overall indicator of labor market tightness—it is still high but falling.





Labor force participation gains have stalled and the rate remains below pre-pandemic levels

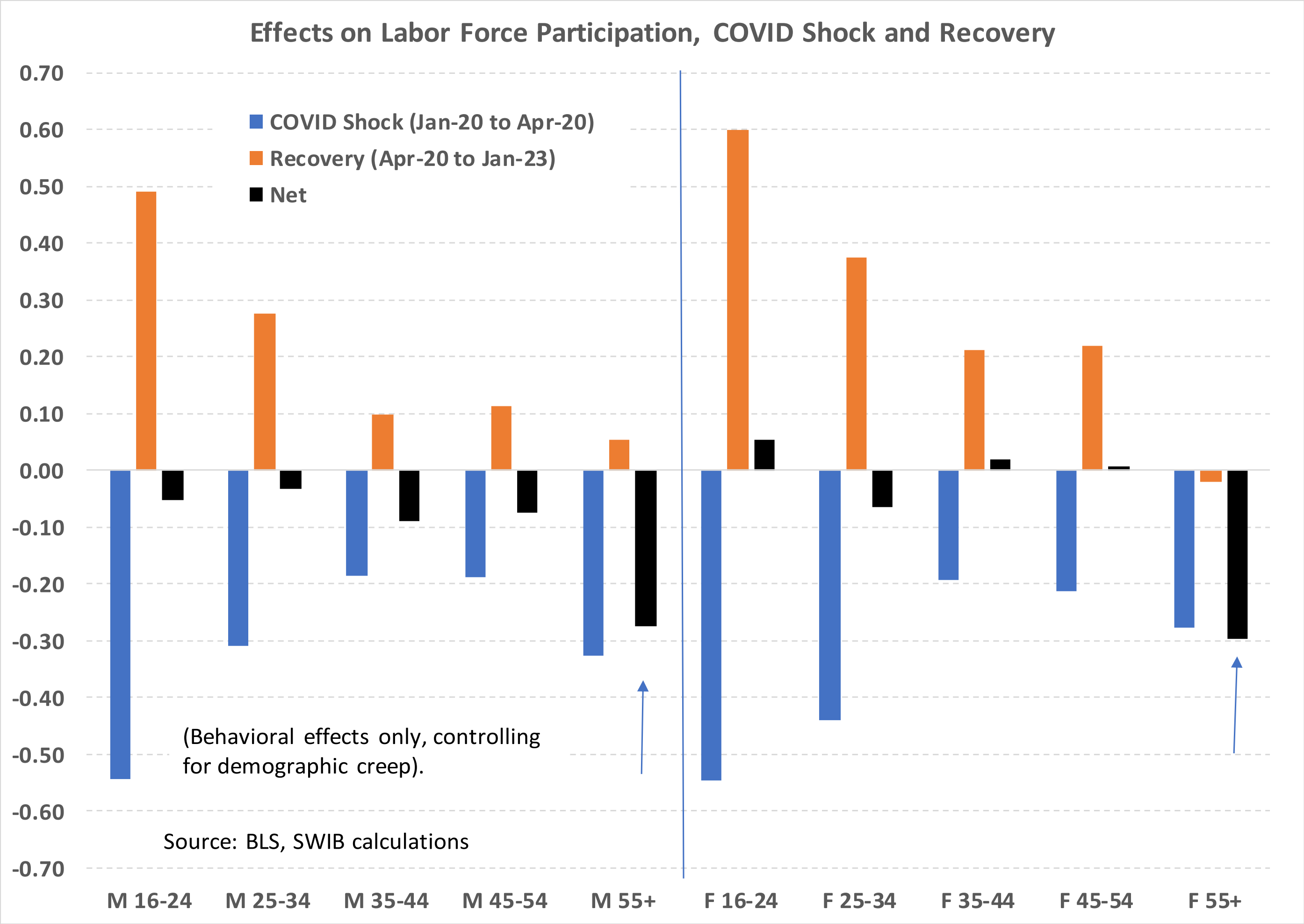
Further gains in labor supply would help moderate wage gains, but are taking time



STATE OF WISCONSIN INVESTMENT BOARD

Big declines in participation across all demographic groups

Further gains in labor supply would help moderate wage gains, but are taking time

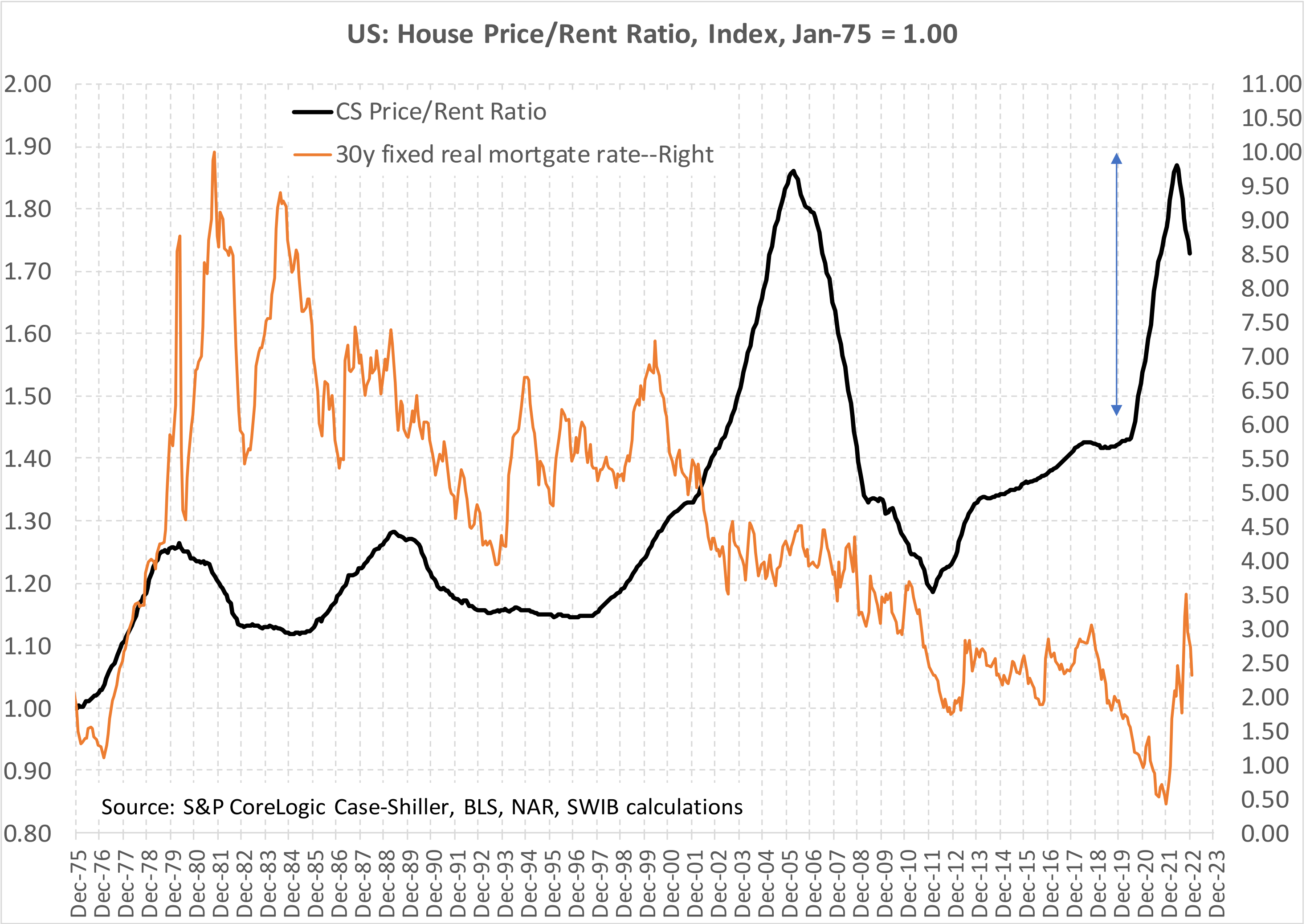


- Onset of COVID saw big drops in participation across all age and sex groups.
- The recovery since the Apr-20 participation trough has been less than complete.
- Exit of both M and F aged 55+ from the labor force (retirements, early retirements) leave overall participation 53 bps below the pre-COVID level.
- M aged 35-44 (-12 bps) and F aged 16-24 (-14 bps) are also notable in holding participation down relative to pre-COVID levels.

SWIB STATE OF WISCONSIN INVESTMENT BOARD

Housing Market

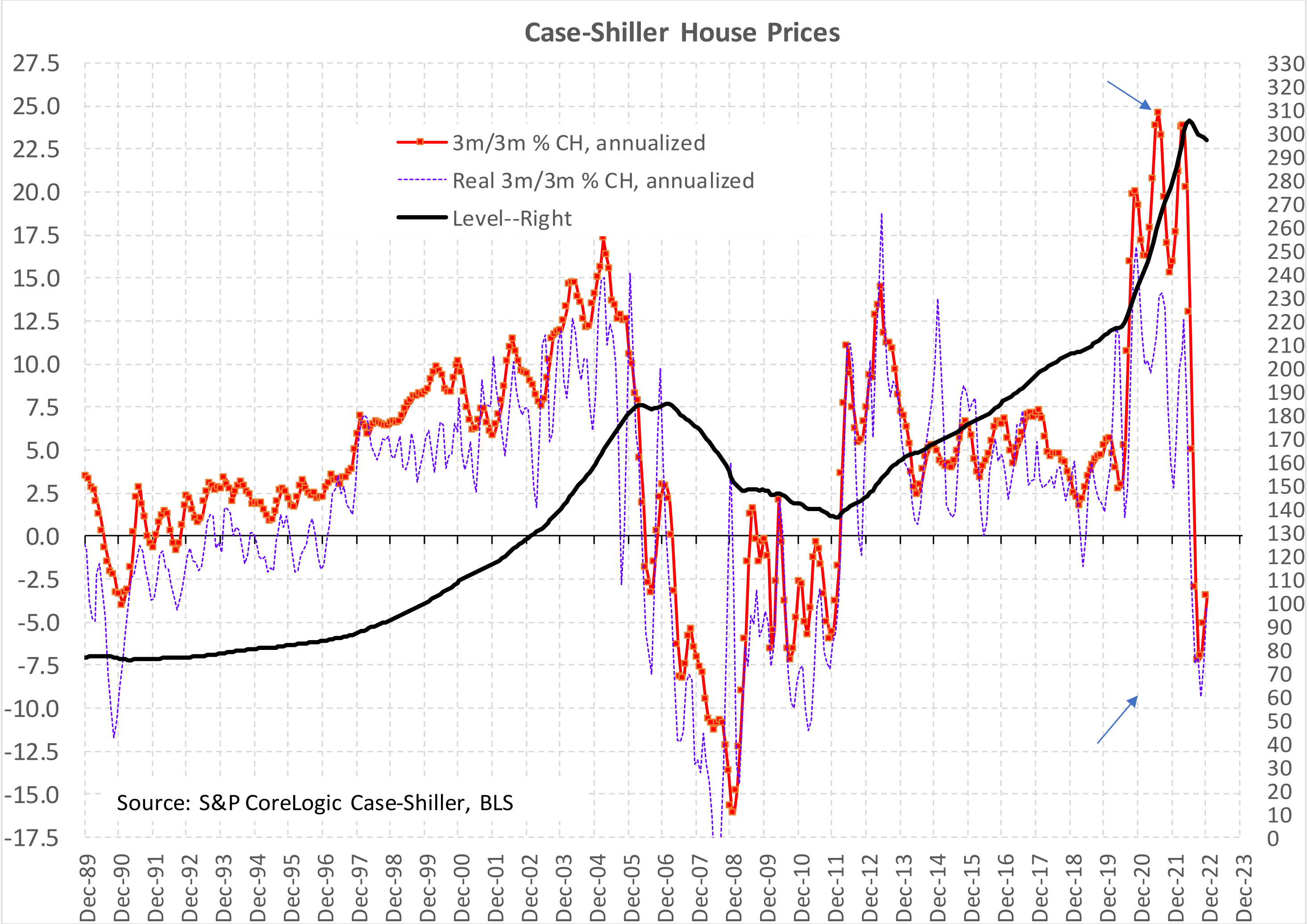
Housing market overvaluation reached lofty 2006 levels by May-22, but has been correcting since



- Easy monetary policy, COVID-related 2nd -home buying were two big forces behind the run-up.
- Both forces are in reverse now, portending further correction of current extreme over-valuation.

STATE OF WISCONSIN INVESTMENT BOARD

House prices have been declining outright since Jun-22



SWIB
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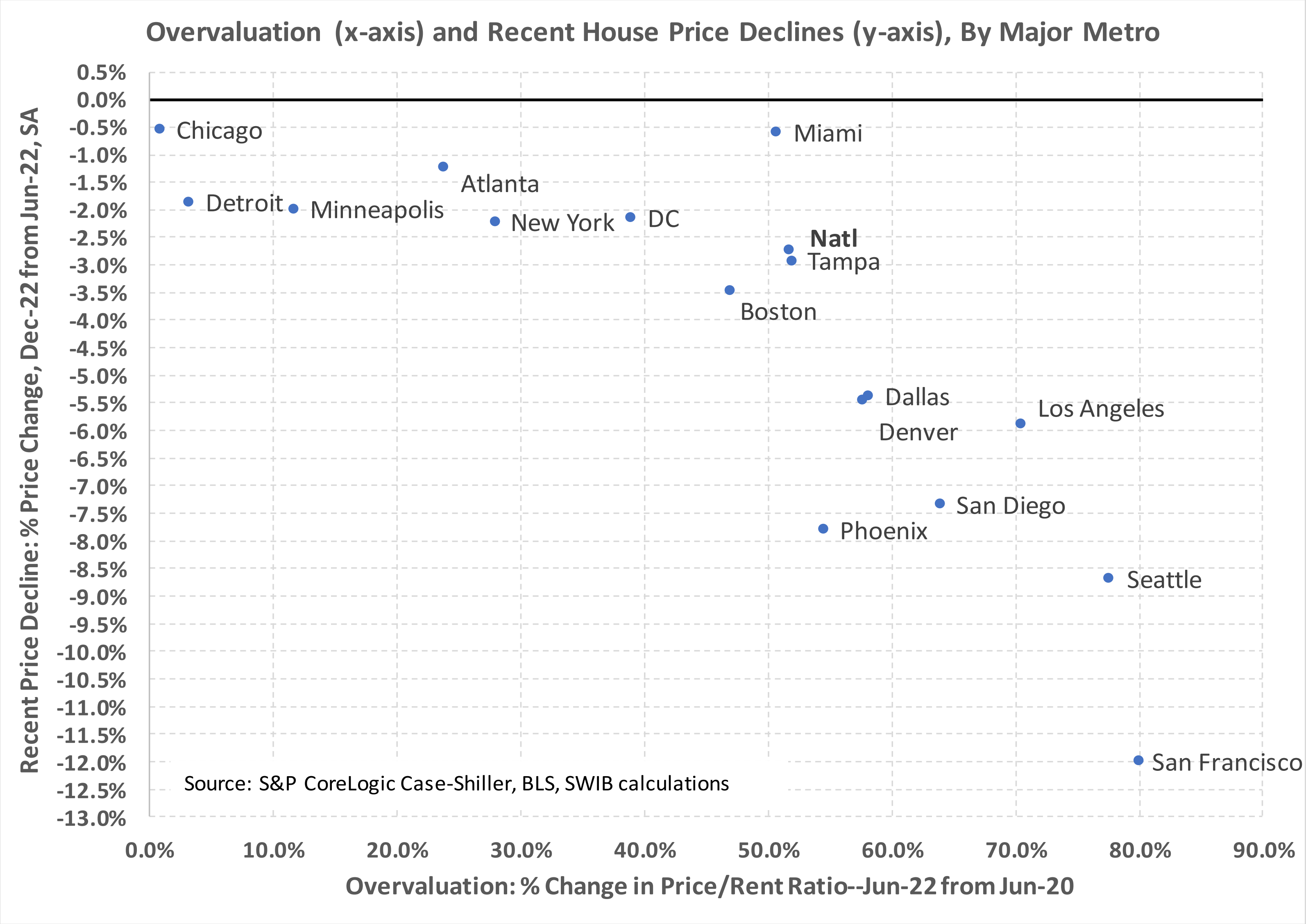
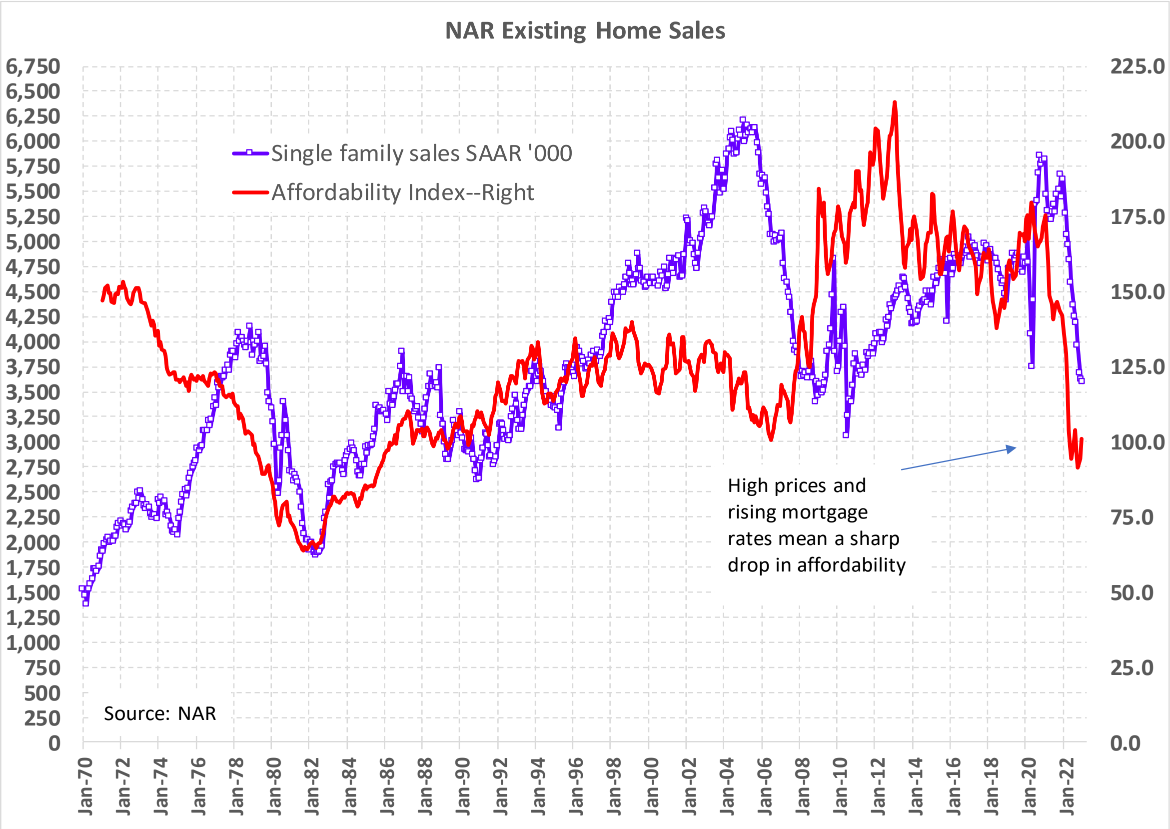
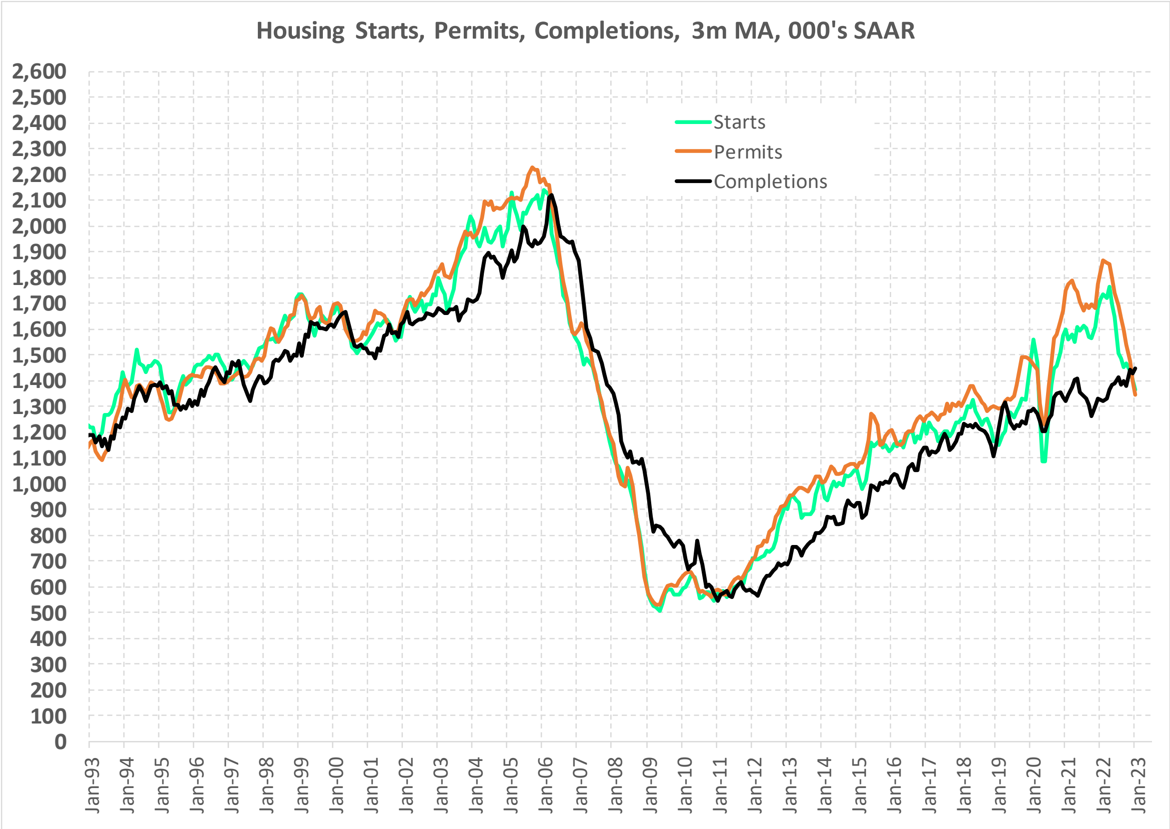
Cities with the most overvalued housing markets suffered the biggest declines between Jun and Dec '22



SWIB STATE OF WISCONSIN INVESTMENT BOARD

Interest-sensitive housing sales and construction activity are declining
Although completions are still steady at a 1.45 million unit SAAR rate, given pipeline of existing projects





STATE OF WISCONSIN INVESTMENT BOARD

How much might house prices correct?

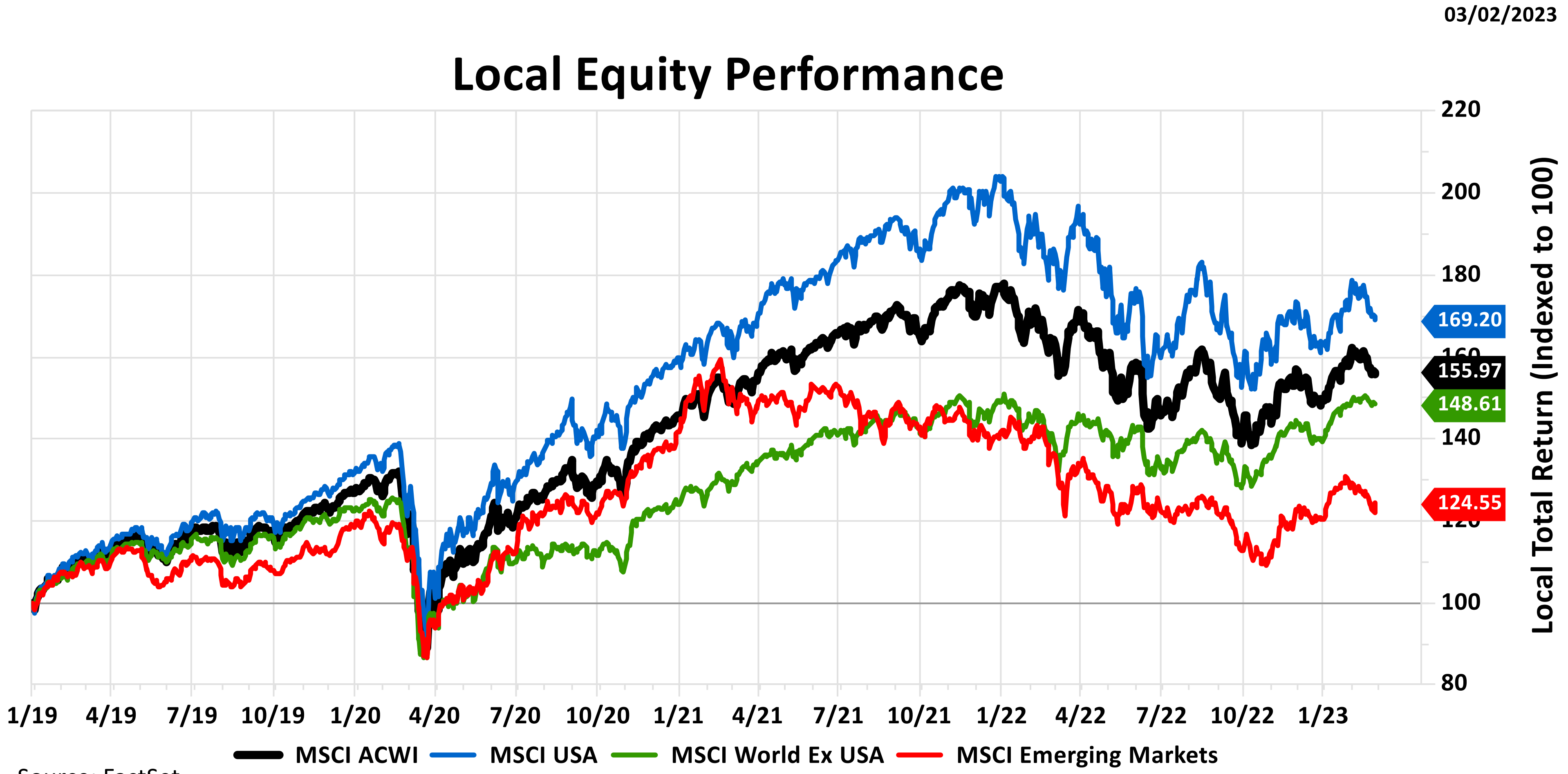
- While housing is overvalued and will see price declines, the correction may not be as deep as that of 2006-11, and is pretty unlikely to cause as much stress for households and the financial system.
- #1: Housing demand has outstripped supply over the last decade, leaving the market fundamentally short of housing.
- #2: Household balance sheets are in much better shape than in over-extended 2006-7, and debt service ratios are much lower.
- #3: Mortgage borrowing and lending has been prudent relative to the go-go 2000’s.

- Some borrowers could still get into cash-flow trouble in the coming year, particularly if there is an at-least-mild recession with rising unemployment…
- …and buyers that were “last in” to the recent house-price run-up could conceivably find themselves in a position of at least moderate negative equity…
- …but on the whole a wave of defaults as in 2008-10 seems implausible.

Asset Class Review

Global Equities - Performance

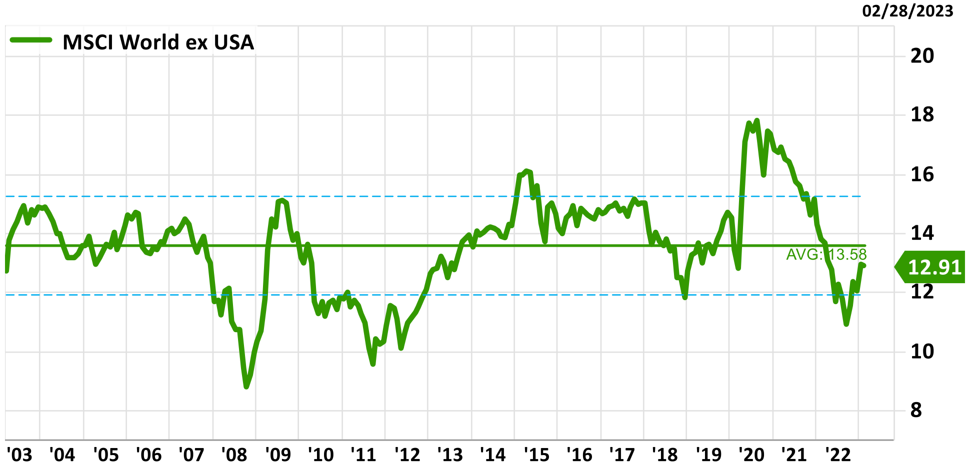
Equity markets have been volatile in the past few months

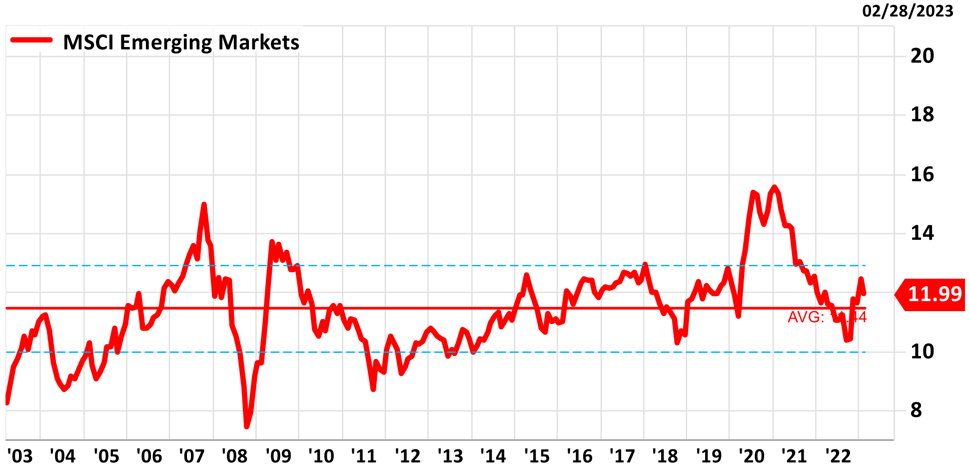


Source: FactSet

Global Equities - Valuation

US P/E ratios are above the 20-year average level

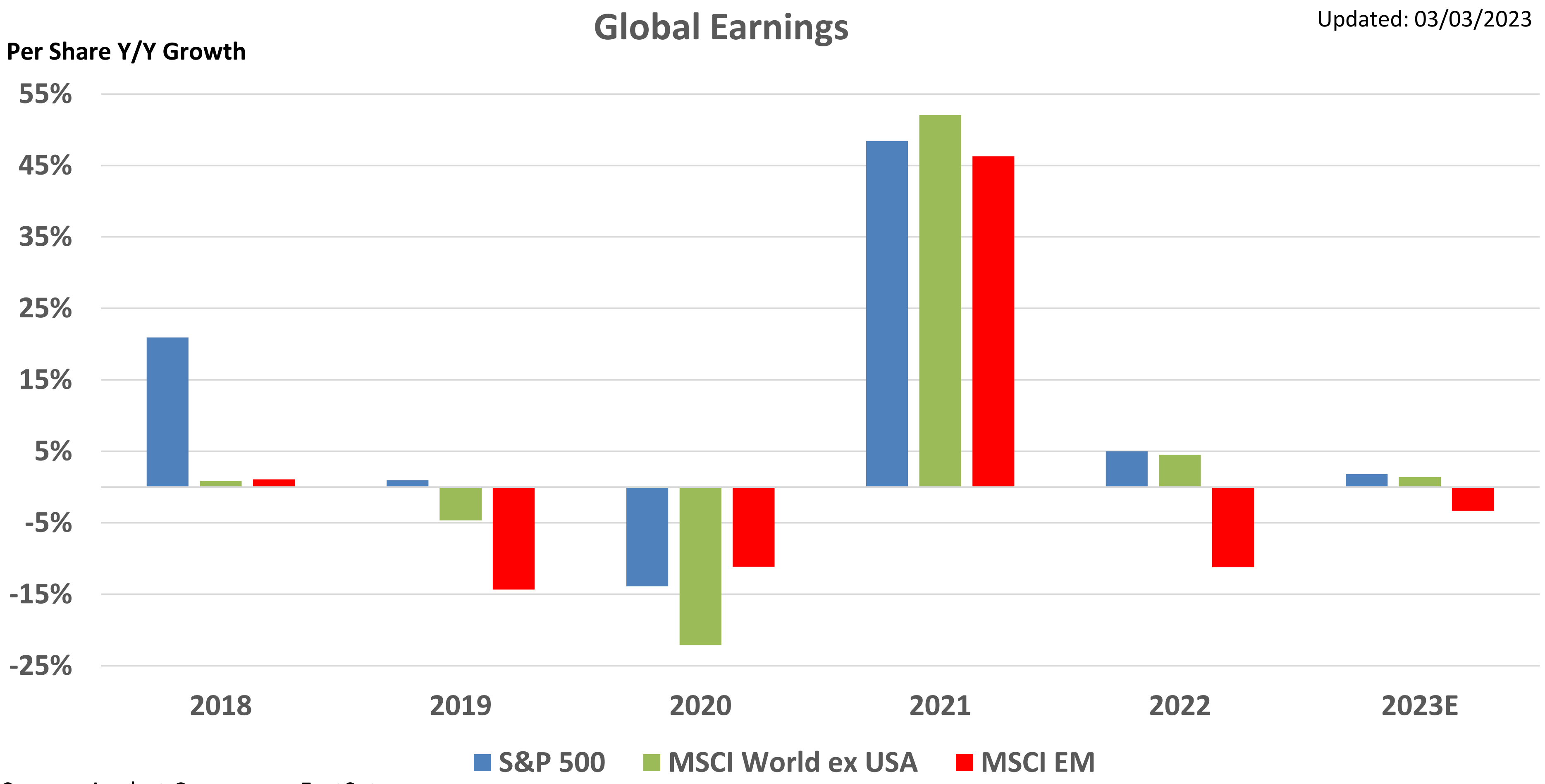




Source: FactSet Market Aggregates - Next Twelve Month P/E Ratio, monthly, 20-year Average with 1 Std. Dev. Bands

Earnings Growth

Emerging Markets earnings downturn continues in forecast



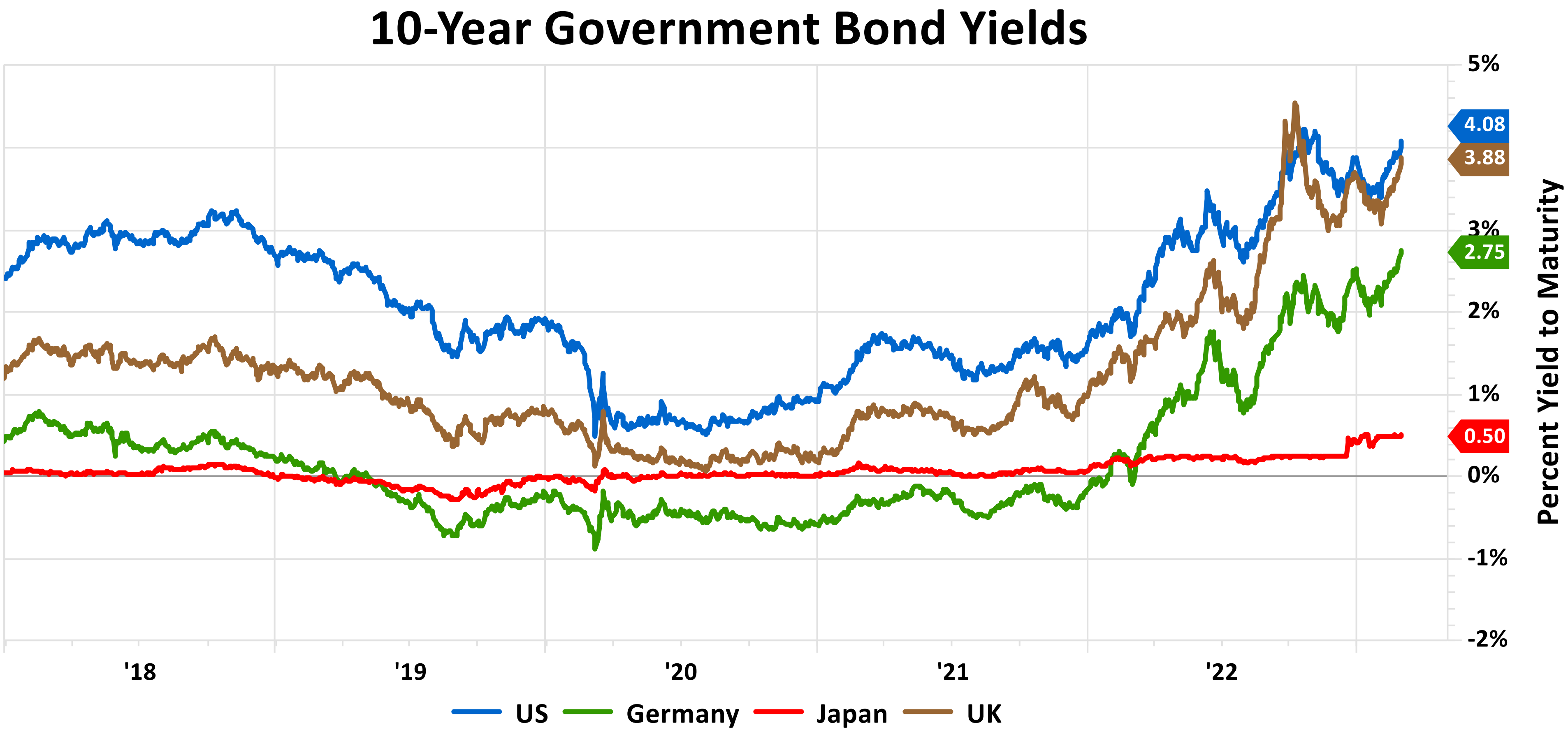
Source: Analyst Consensus; FactSet

STATE OF WISCONSIN INVESTMENT BOARD

Global Bonds

US yield edge up as investors weigh inflation and global economic growth

03/02/2023

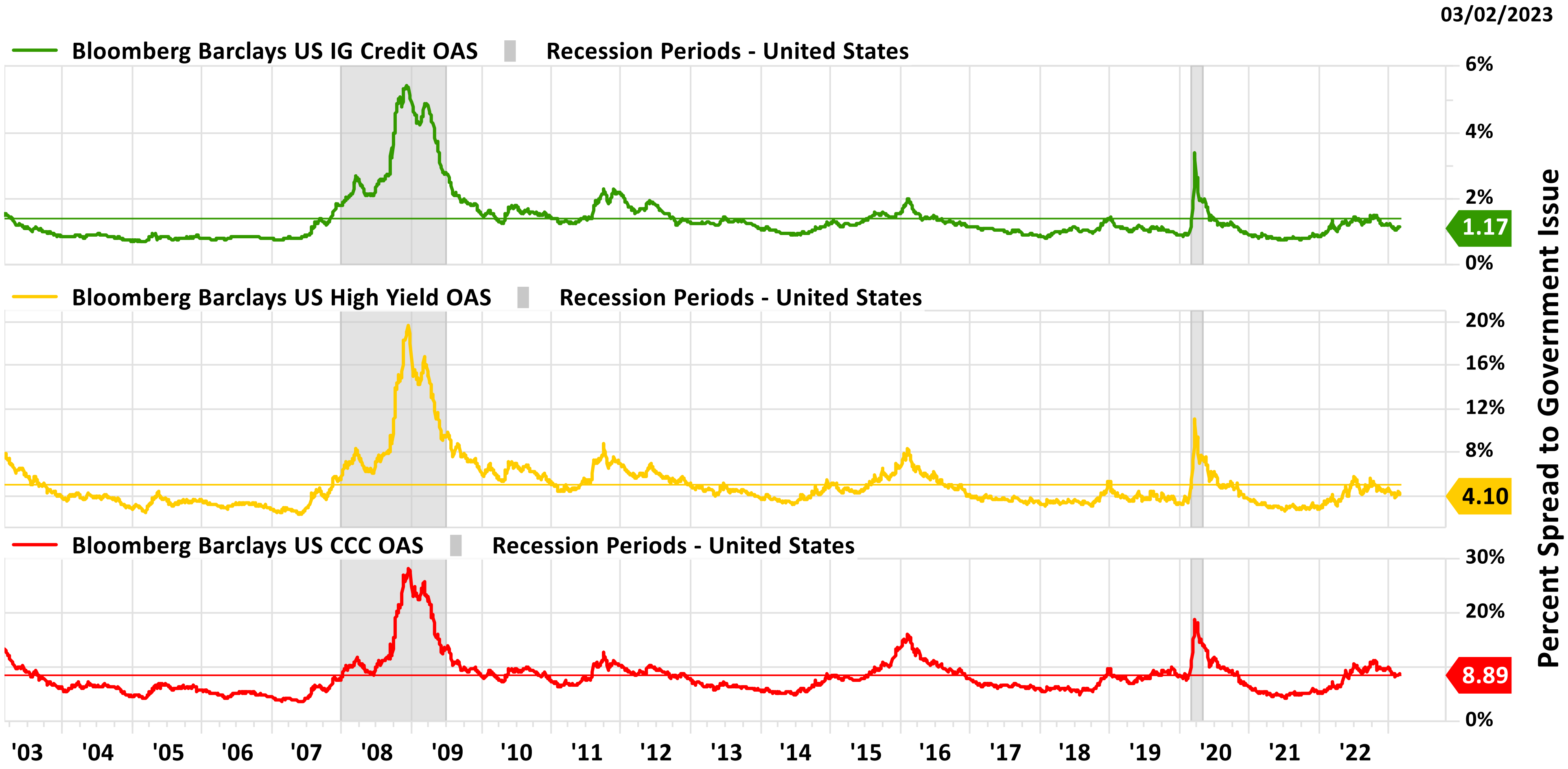


Source: FactSet

SWIB STATE OF WISCONSIN INVESTMENT BOARD

Credit Sectors

Spreads level around the long run averages



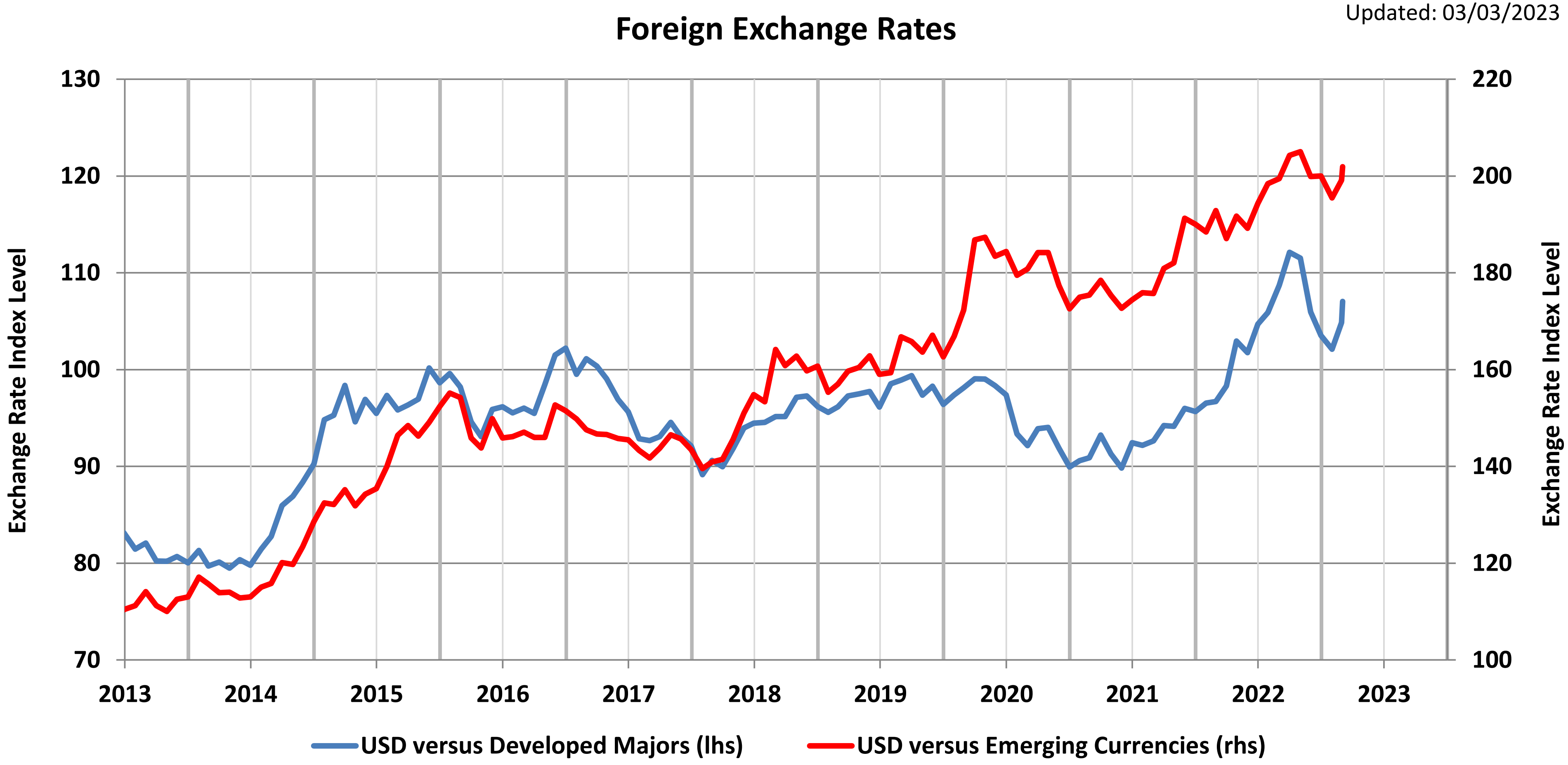
Source: FactSet

SWIB
STATE OF WISCONSIN INVESTMENT BOARD

Currency Performance

U.S. Dollar has gained to start the year

Updated: 03/03/2023



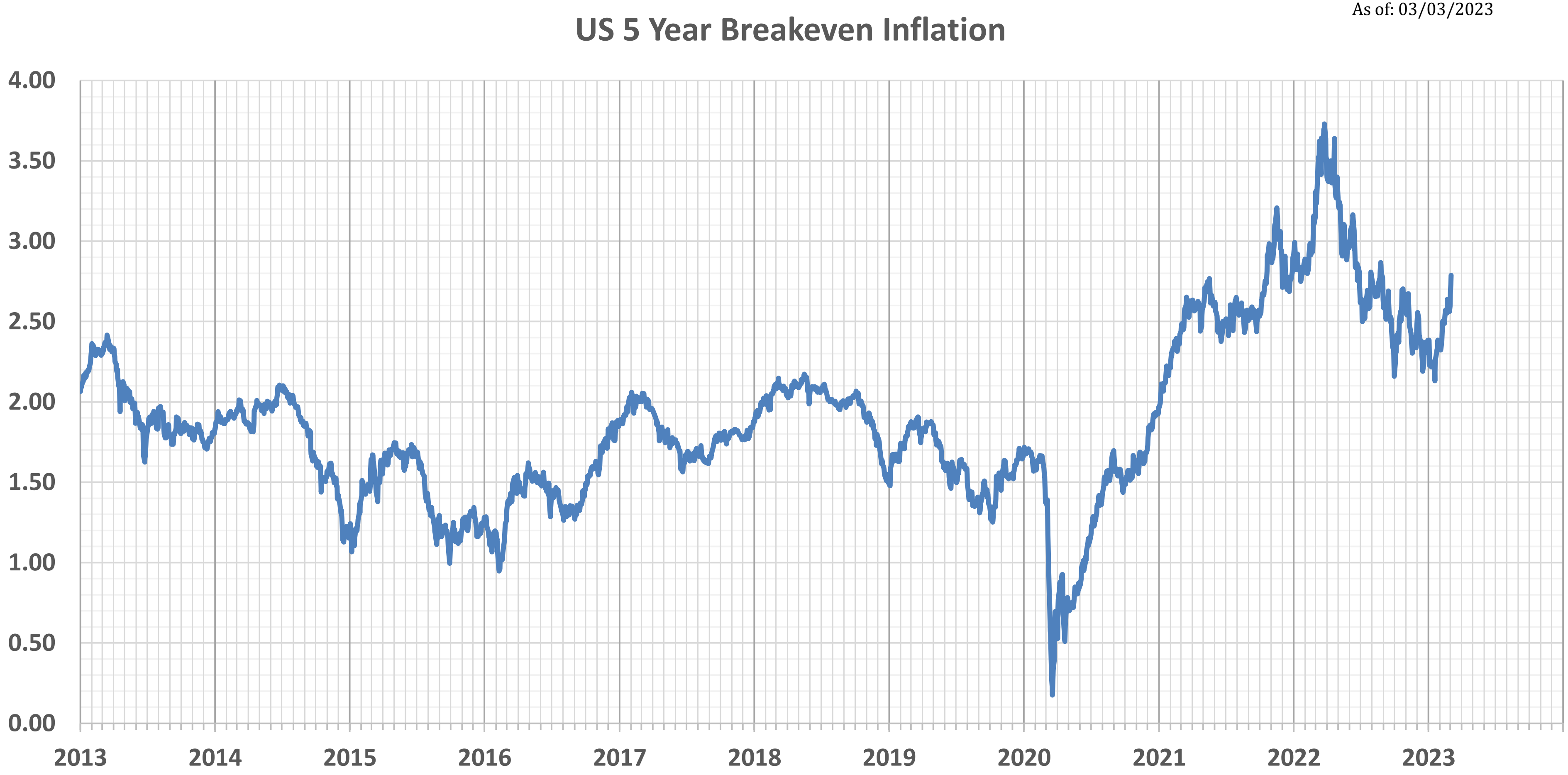
Source: Bloomberg, DXY Index, JPM Emerging Markets Currency Index (Inverted)

STATE OF WISCONSIN INVESTMENT BOARD

U.S. Inflation

Medium term expectations have trended upward to start 2023

As of: 03/03/2023

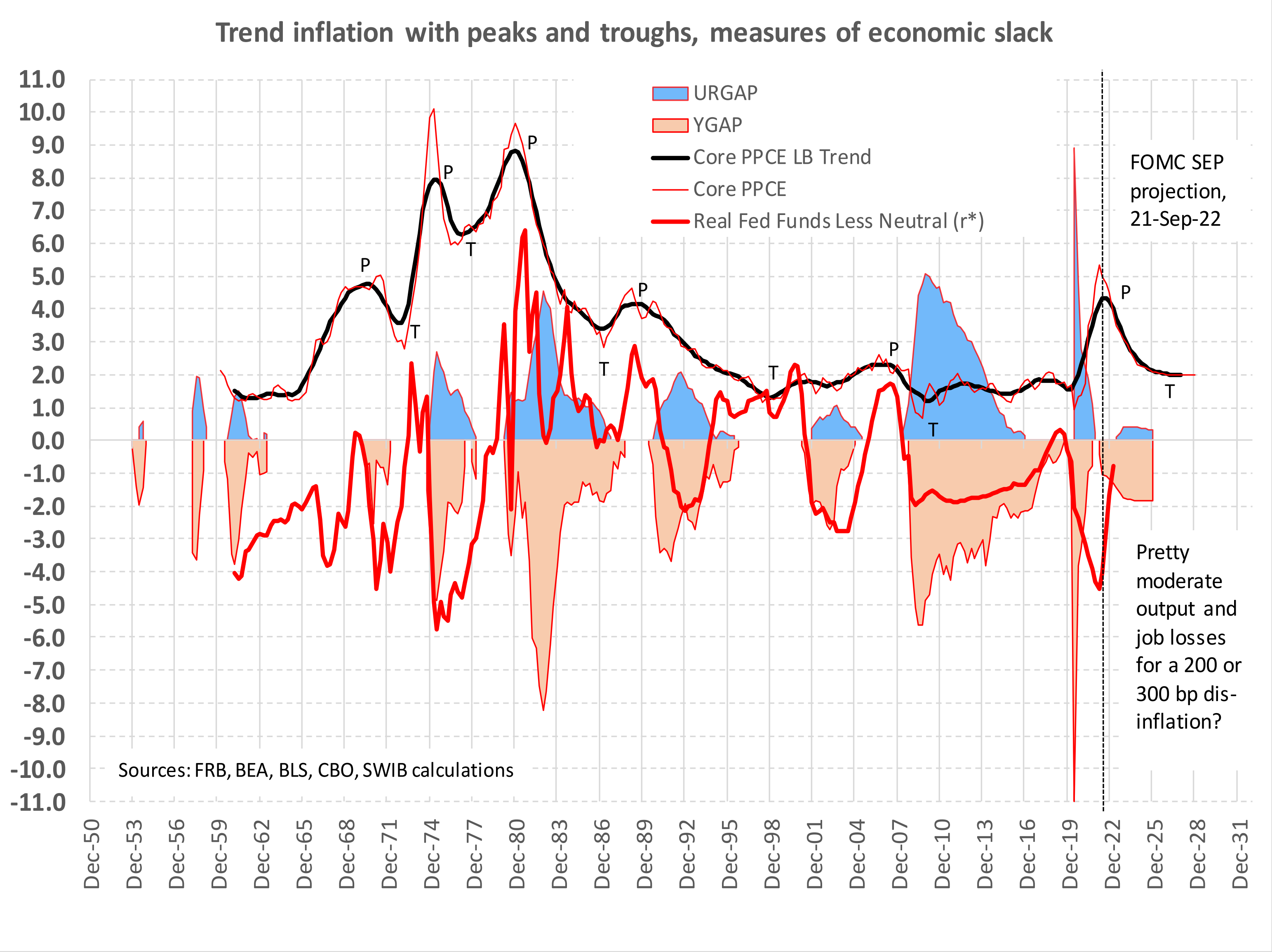


Source: Bloomberg

SWIB STATE OF WISCONSIN INVESTMENT BOARD

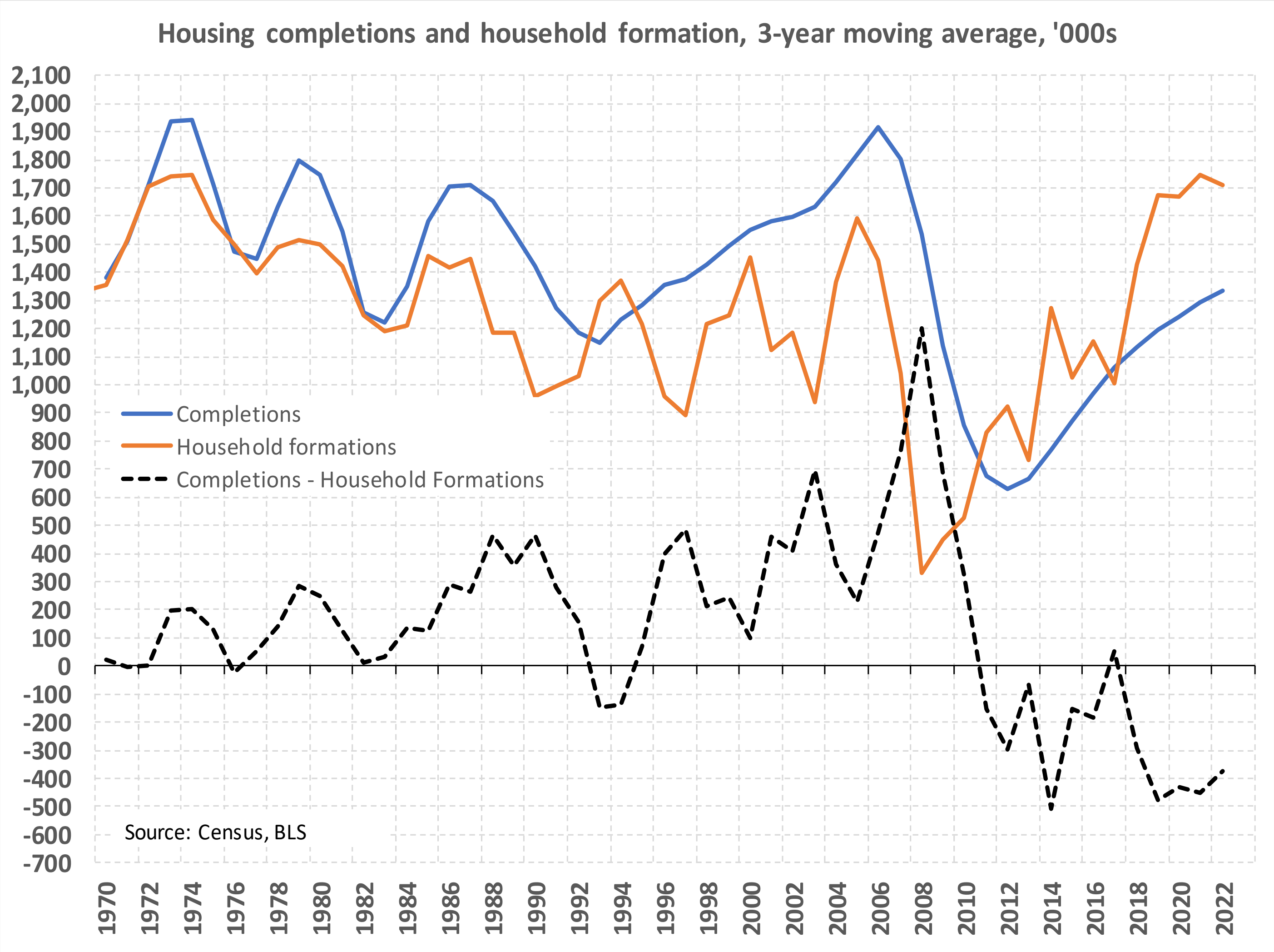
Appendix

Is the FOMC dis-inflation projection too optimistic?



- Major disinflations of the sort now needed in the US are usually brought about by central bank tightening.
- Major disinflations also require sacrifices of jobs and GDP relative to full-employment levels (potential GDP, non-cyclical unemployment rate).
- These sacrifices are captured by the blue (jobs) and orange (GDP) shaded areas.
- The 21-Sep 22 FOMC Summary of Economic Projections (SEP) is contextualized at left.
- The SEP has attracted some commentary. Can a disinflation from current 4%-5% core PCE inflation back to the Fed's 2% inflation target by 2025 really be achieved with only modest output losses, and even more modest job losses?

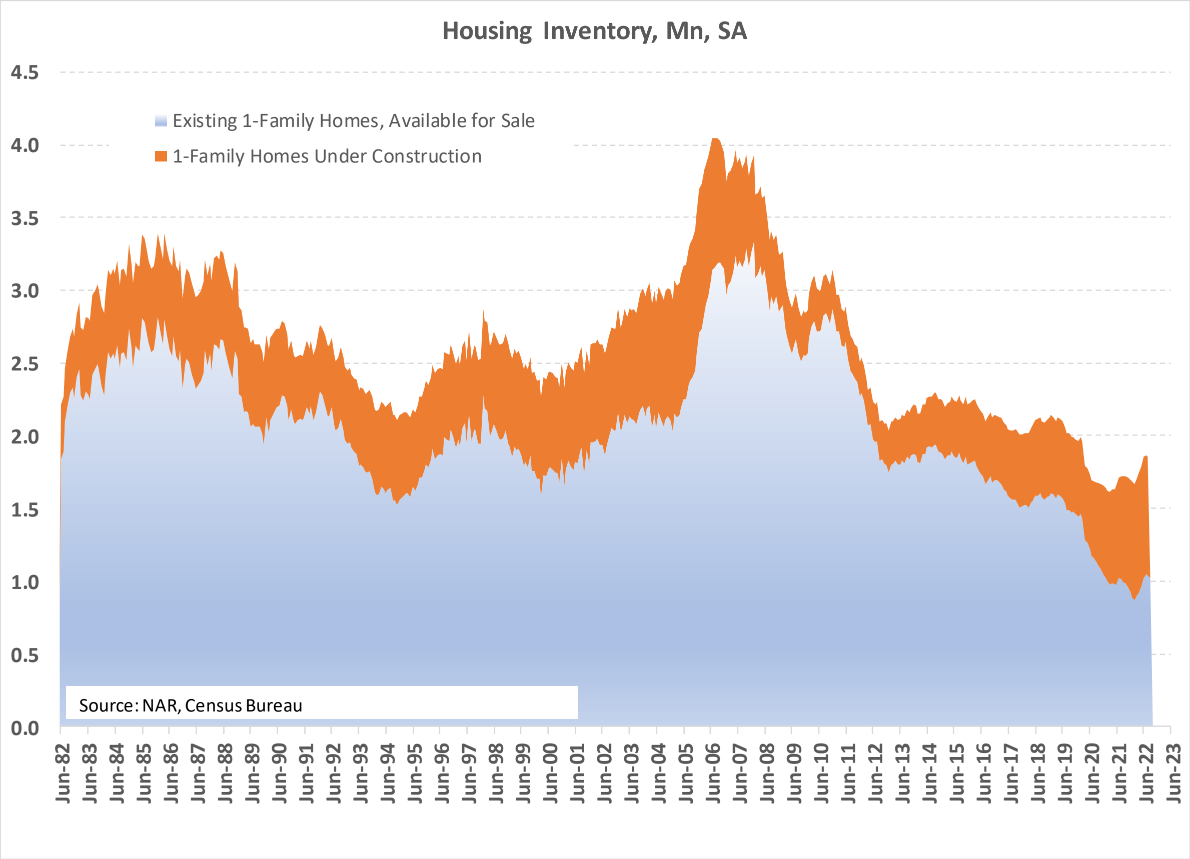
Demand for housing has outstripped supply over the last decade

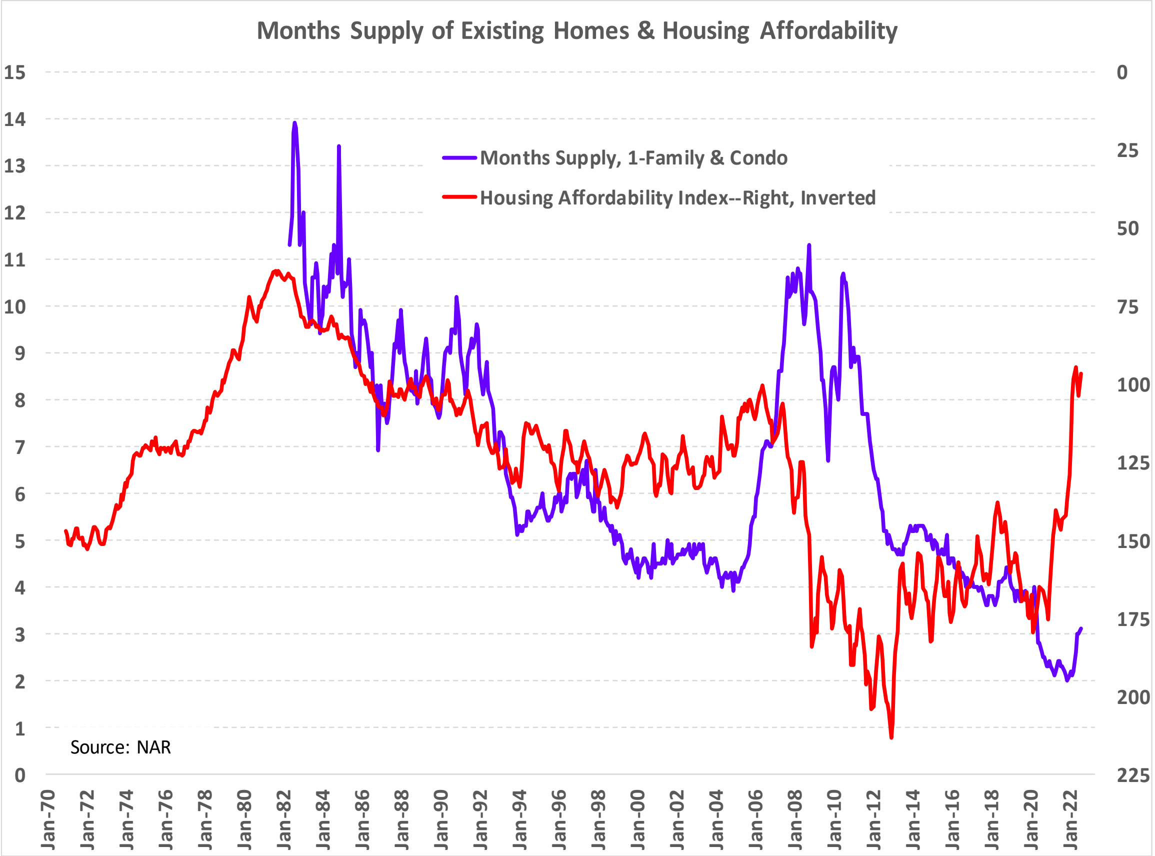


- Building contracted during 2006-11 and has not since rebounded to accommodate a rebound in household formations.
- The flow mismatch looks to have left the US with a too-low stock of housing.
- Low stocks were met with low interest rates and strong COVID-related demand to cause the sharp 2020-22 house price gains.
- While rates have risen and COVID factors are fading, the basic undersupply situation is intact, and will only be slowly corrected.

SWIB
STATE OF WISCONSIN INVESTMENT BOARD

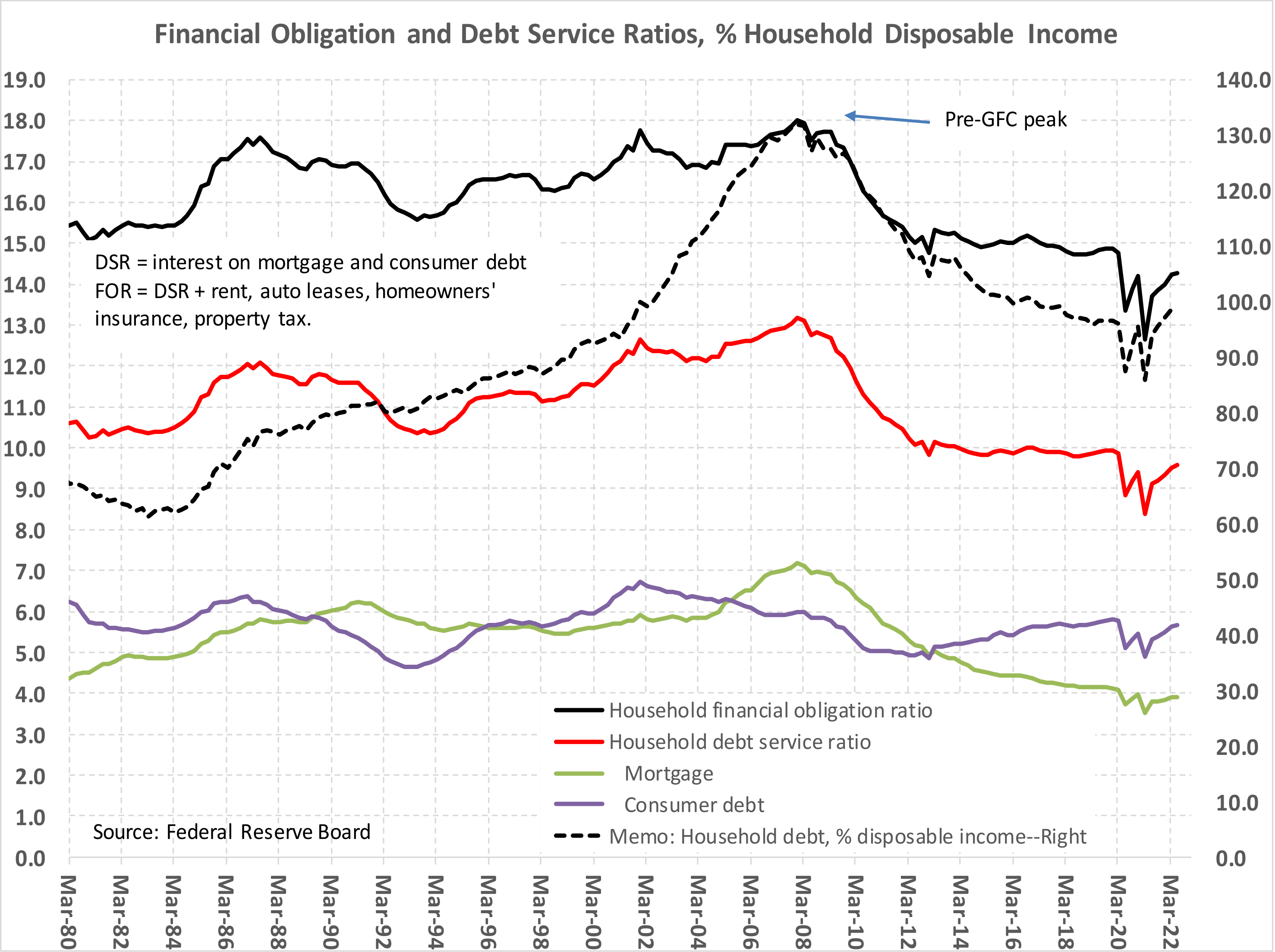
Stock of homes for sale is low relative to 2006-10 and 1980's (S&L crisis)





SWIB
STATE OF WISCONSIN INVESTMENT BOARD

Household financial obligations ratios are at low levels relative to 2006-08 debacle

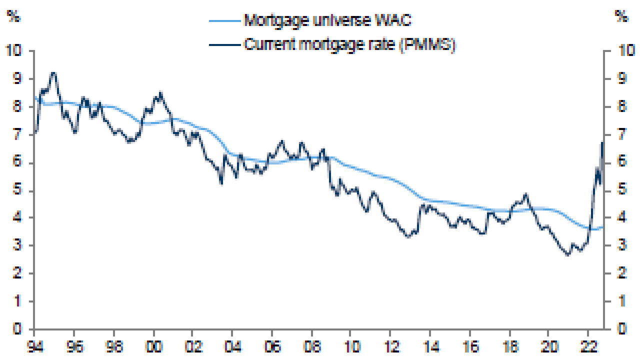


- Some households could experience difficulties servicing debt, especially if there is a recession in 2023.
- But in aggregate, financial obligations relative to income are historically low, and much lower than in 2006.

STATE OF WISCONSIN INVESTMENT BOARD

High mortgage rates will curtain new demand, but relatively few borrowers have locked at the recent highs. Importantly, floating rate mortgages are out of fashion and borrower creditworthiness is high.

Exhibit 7: The average mortgage borrower holds a note rate 300 bps below current market mortgage rates
30-year fixed conforming mortgage rates and the outstanding weighted average note rate



Source: eMBS, Freddie Mac, Goldman Sachs Global Investment Research

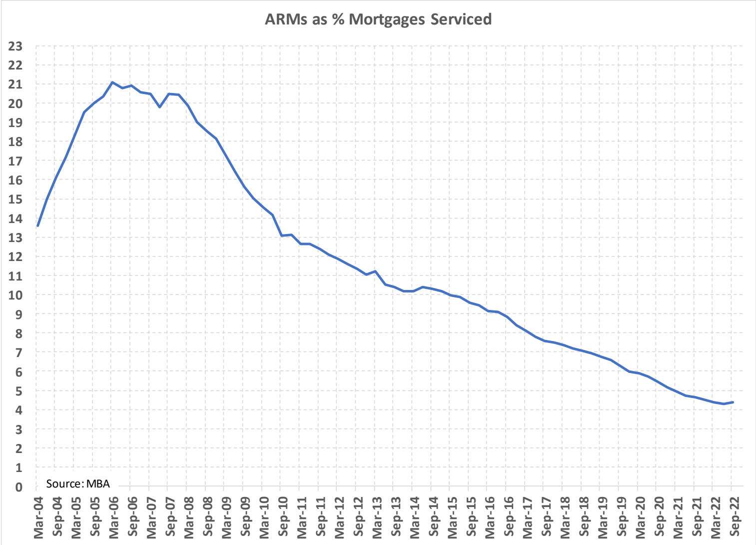
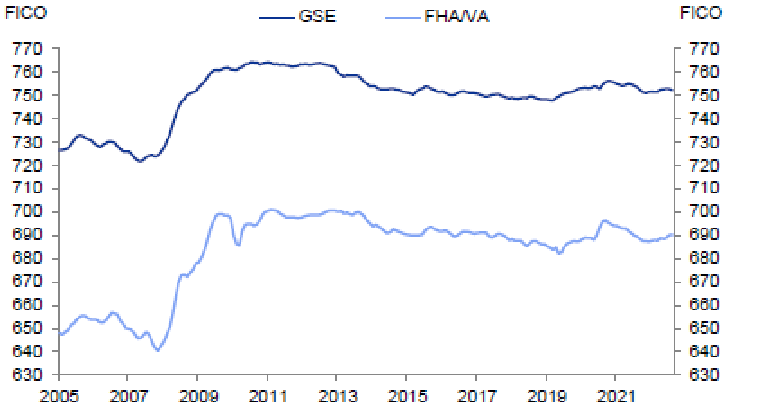


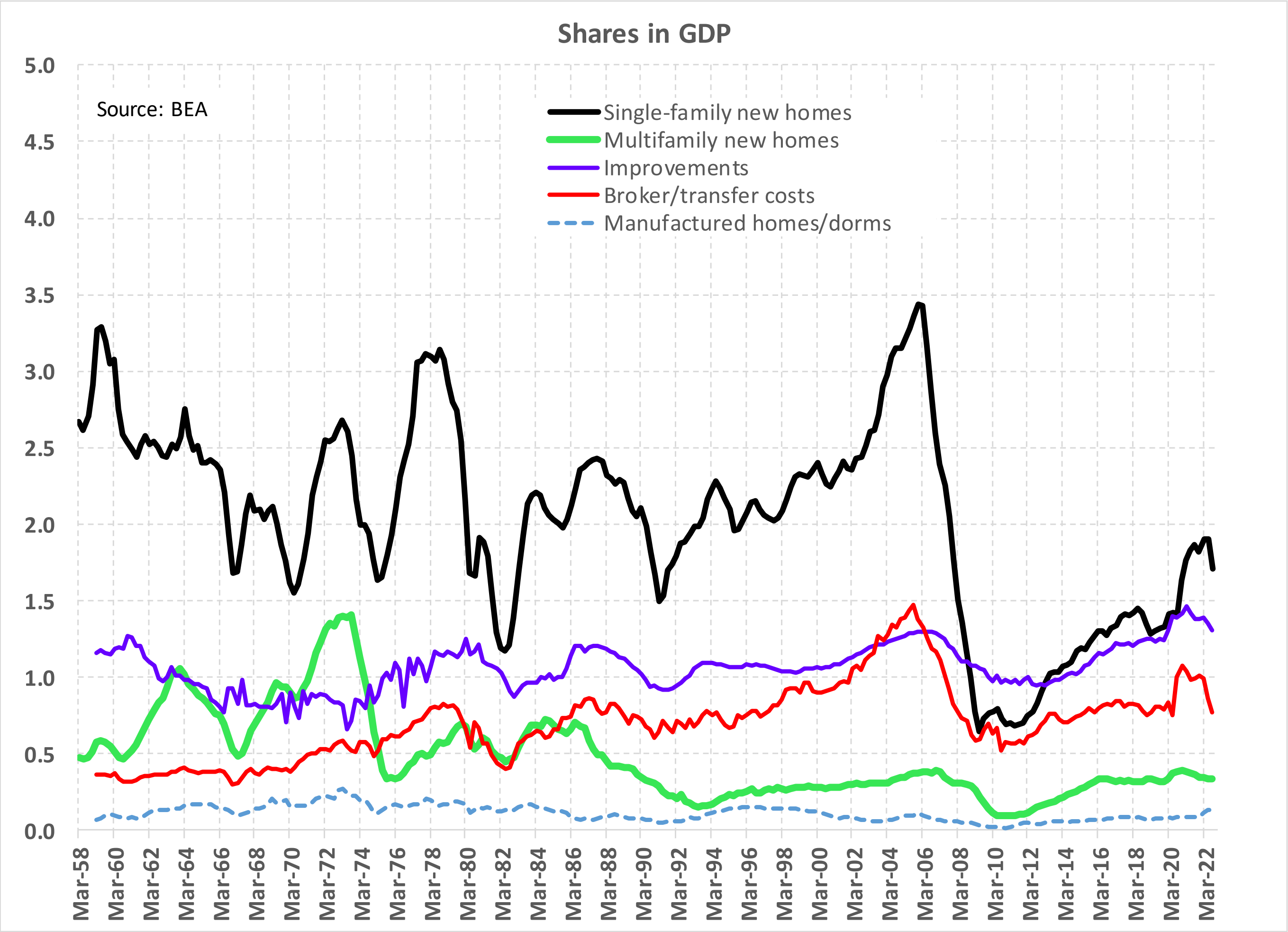
Exhibit 25: FICO scores at origination remain elevated relative to pre-GFC levels
Average FICO at origination for purchase mortgages



Source: Black Knight, eMBS, Goldman Sachs Global Investment Research

STATE OF WISCONSIN INVESTMENT BOARD

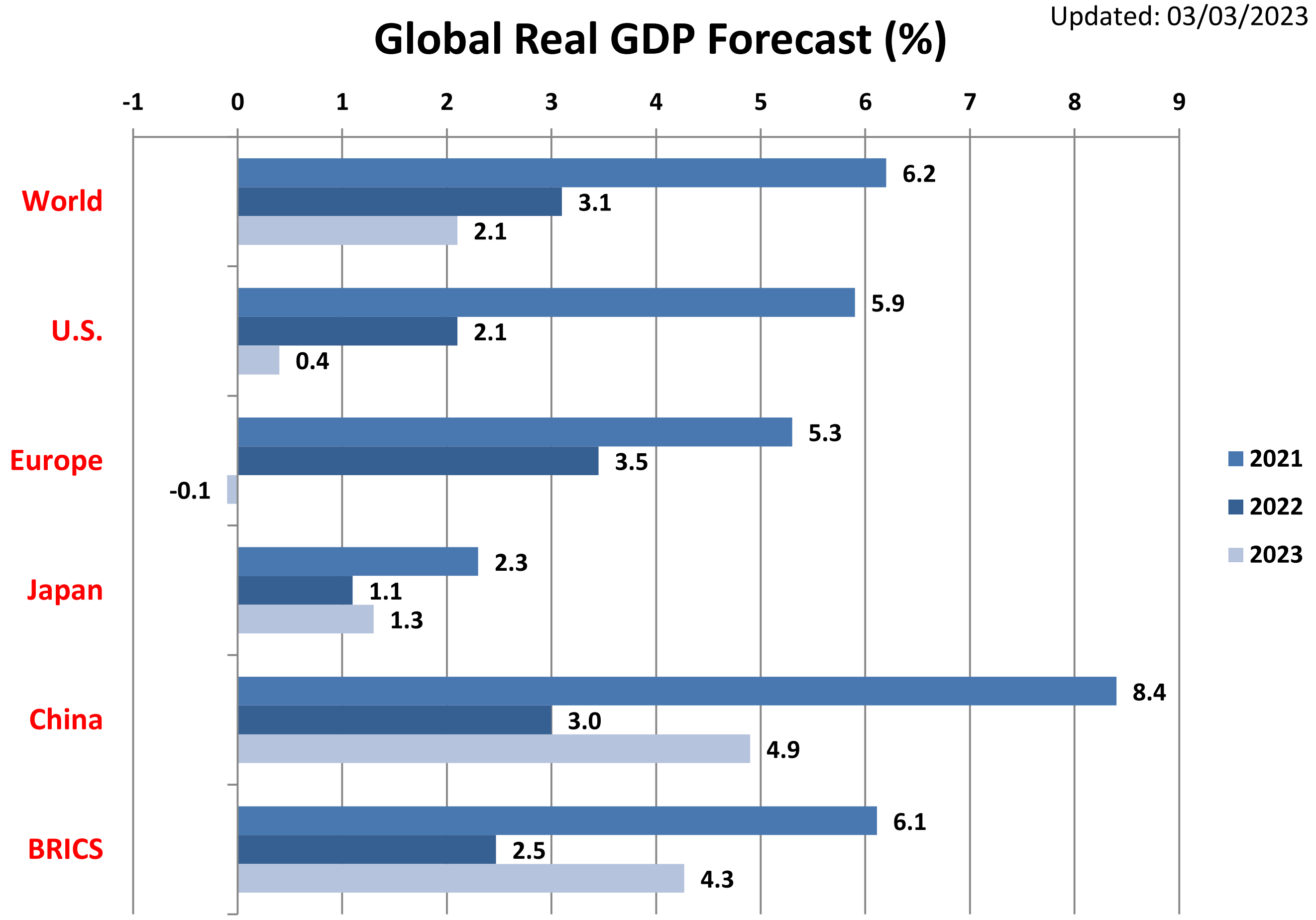
Dependence of economy on housing activity is low by historical standards, and given supply-demand imbalance, correction in construction could be moderate



SWIB STATE OF WISCONSIN INVESTMENT BOARD

Global Growth

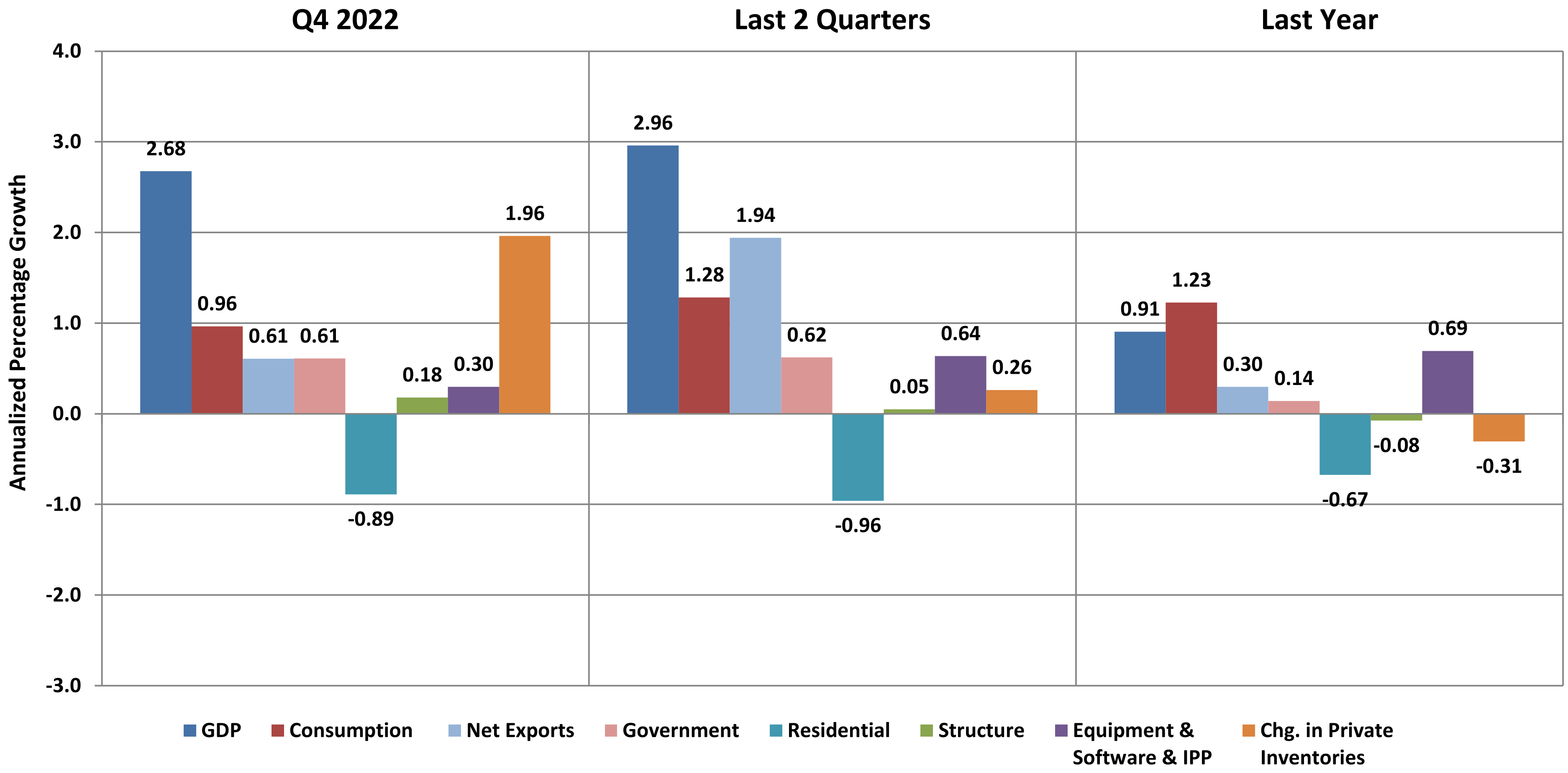
EM growth rebound expected for 2023



Source: Bloomberg Consensus

U.S. Growth

Residential investment has detracted from growth

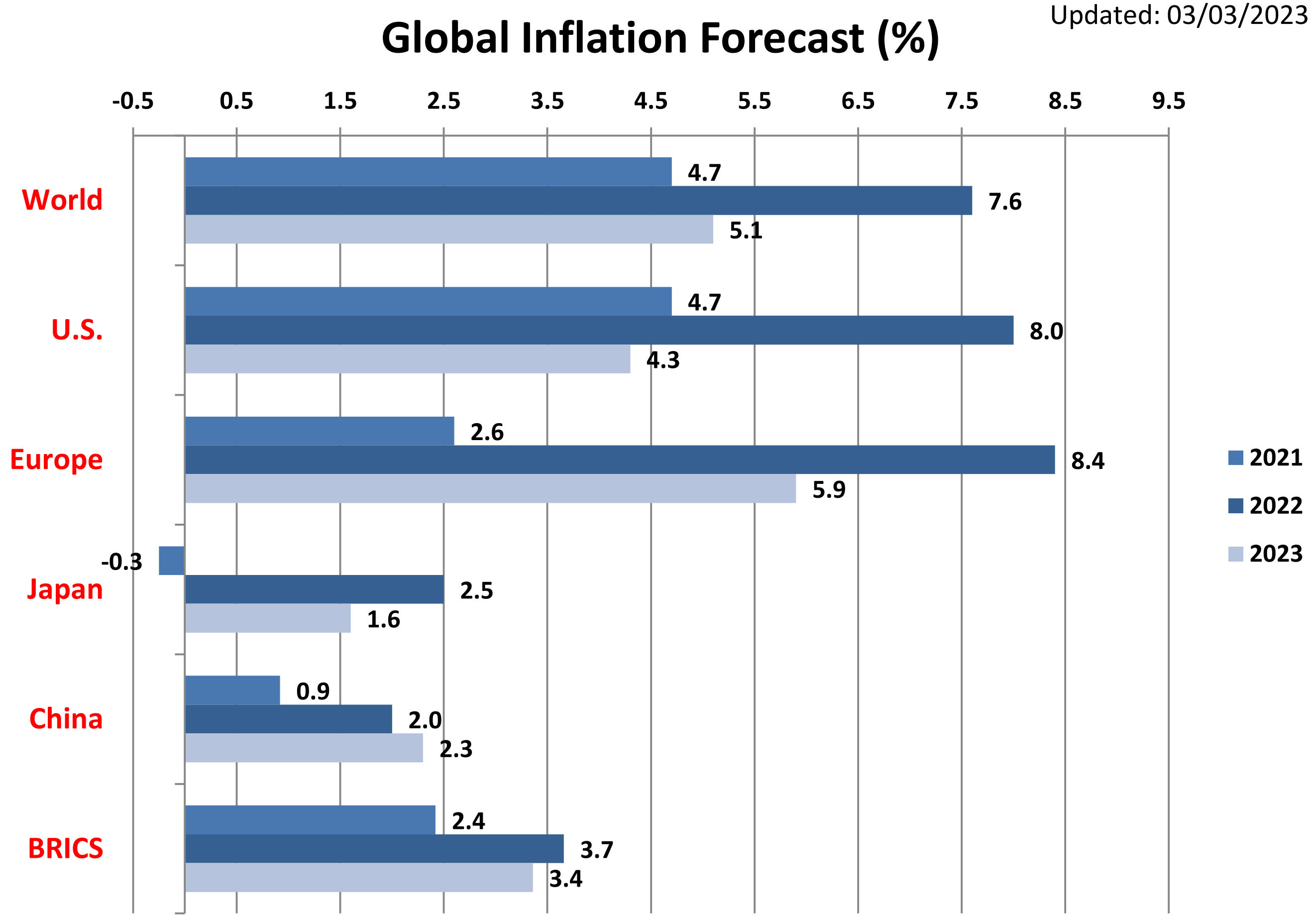


Source: Bloomberg, Bureau of Economics Analysis

Global Inflation

Consensus expectations for 2023 are for easing inflation

Updated: 03/03/2023

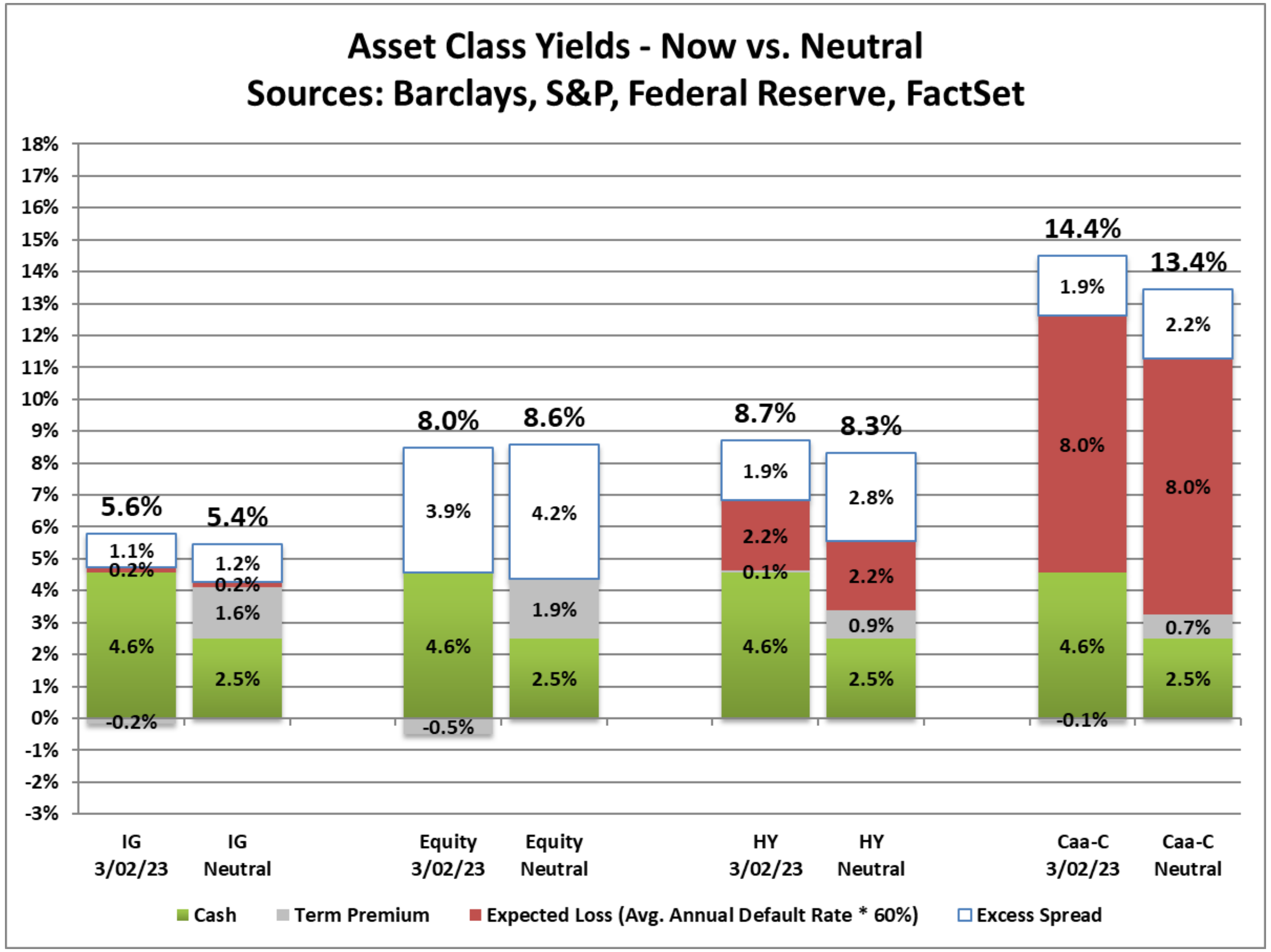


Source: Bloomberg Consensus

SWIB STATE OF WISCONSIN INVESTMENT BOARD

Asset Yields

Yield on cash investments has well surpassed equilibrium



STATE OF WISCONSIN INVESTMENT BOARD

Valuation Indicators

U.S. Bond yield is well above recent history

Valuation Metric	Valuation Date	Current	1 Yr	5Yr	10 Yr	All Data	Earliest Data
10 Year Treasury Yield (%)	Mar-2023	4.0	3.3	2.1	2.2	5.9	Jan-62
S&P 500 Forward P/E (NTM)	Mar-2023	17.6	17.6	19.2	18.0	17.5	Jan-90
MSCI xUS Forward P/E (NTM)	Mar-2023	12.2	12.7	15.0	15.0	14.2	Feb-05
Private Equity Multiple (EBITDA, Large)	Dec-2022	11.9	11.9	11.4	10.8	9.2	Jan-94
Barclays Corp Investment Grade OAS (bps)	Mar-2023	122	137	121	124	131	Jun-89
Barclays Corp High Yield OAS (bps)	Mar-2023	408	457	411	430	495	Jan-94
US Inflation (Calendar YoY %)	Mar-2023	7.7	7.9	3.7	2.5	3.9	Jan-62
US Real GDP Growth (Calendar YoY %)	Mar-2023	1.8	2.1	2.1	2.1	3.0	Dec-61
US Volatility	Mar-2023	18.5	25.5	21.7	18.2	19.8	Jan-90
Europe Volatility	Mar-2023	18.1	26.9	22.1	21.1	23.9	Jan-99
UK Volatility	Mar-2023	16.8	19.1	19.5	17.2	18.5	Jan-00
Japan Volatility	Mar-2023	16.1	22.9	22.3	22.6	24.6	Jan-98

US 2023 GDP Growth Forecast: 0.4%
US 2022 CPI Forecast: 4.3%

Source: FactSet, Bloomberg

SWIB STATE OF WISCONSIN INVESTMENT BOARD

Board Meeting

Tab 11 – Announcement of Matters Taken Up in Closed Session

Board Meeting

Tab 12 – In the Absence of Questions, the Following Reports will be filed without comment (for informational purposes):

A. Quarterly Charges to Funds Reports, Q4 2022

B. Private Markets and Funds Alpha Commitments, Q4 2022

C. Board Contact Log

February 13, 2023

Senator Howard Marklein, Co-Chair
Joint Committee on Finance
P.O. Box 7882
Madison, WI 53707

Representative Mark Born, Co-Chair
Joint Committee on Finance
P.O. Box 8952
Madison, WI 53708

Senator Eric Wimberger, Co-Chair
Joint Legislative Audit Committee
P.O. Box 7882
Madison, WI 53707

Representative Robert Wittke, Co-Chair
Joint Legislative Audit Committee
P.O. Box 8953
Madison, WI 53708

Secretary Kathy Blumenfeld
Department of Administration
101 East Wilson Street
P.O. Box 7864
Madison, WI 53707

Dear Senator Marklein, Senator Wimberger, Representative Born, Representative Wittke and Secretary Blumenfeld:

State statutes require the State of Wisconsin Investment Board (SWIB) to report all expenses charged to the trust funds under management and the number of full-time equivalent positions created or abolished during the quarter[1]. The information contained in this report is for the quarter ended December 31, 2022.

Total Cost of Management Summary	1Q2022	2Q2022	3Q2022	4Q2022	Trailing 4 Qtr Total	% of Total
Internal Operating Expenses						
Operating Budget Expenses	$ 14,062,637	$ 42,801,859	$ 13,275,388	$ 16,013,990	$ 86,153,874	63.2%
Custodial, Investment Operations & Banking	1,803,372	1,692,456	1,647,965	1,961,451	7,105,244	5.2%
Legal	625,000	625,000	625,000	371,714	2,246,714	1.6%
Investment Research & Consulting	10,007,468	9,150,155	9,112,954	7,570,768	35,841,345	26.4%
Total Internal Operating Expenses	**$ 26,498,477**	**$ 54,269,470**	**$ 24,661,307**	**$ 25,917,923**	**$ 131,347,177**	**96.3%**
Securities Lending Agent Expenses	$ 1,282,912	$ 1,412,138	$ 1,198,959	$ 1,125,732	5,019,741	3.7%
Total SWIB Operating Costs	**$ 27,781,389**	**$ 55,681,608**	**$ 25,860,266**	**$ 27,043,655**	**$ 136,366,918**	**100.0%**
External Investment Management Fees						
Externally Managed Separate Account Fees						
Beta One & Other - Separately Managed	$ 12,730,351	$ 6,621,385	$ 15,970,497	$ 12,231,686	$ 47,553,919	6.7%
Supplemental Information - External Fund Fees						
Real Estate	$ 19,209,516	$ 19,257,344	$ 20,775,122	$ 20,890,279	$ 80,132,262	11.2%
Private Equity & Venture Capital	56,999,361	72,498,709	67,722,428	72,422,893	269,643,390	37.7%
Hedge Funds	72,033,779	60,862,749	58,023,466	61,423,994	252,343,988	35.4%
Beta One & Other - External Funds	18,411,505	26,091,654	3,044,345	15,891,147	63,438,651	8.9%
Total External Investment Management Fees	**$ 179,384,512**	**$ 185,331,841**	**$ 165,535,858**	**$ 182,859,999**	**$ 713,112,210**	**100.0%**
Total Cost of Management	**$ 207,165,901**	**$ 241,013,449**	**$ 191,396,124**	**$ 209,903,654**	**$ 849,479,128**	

[1]Wisconsin Statutes Section 25.17 (13m): Investment-related costs and expenses charged to the WRS Trust Funds, State Investment Fund, State Life Insurance Fund, Historical Society Endowment Fund, Injured Patients and Families Compensation Fund and UW Trust Fund. Investment transaction expenses, such as trading commissions and interest expense, are included in investment returns, and therefore not included in this report.

SWIB operating costs are charged to the trust funds under management. Externally managed fund fees for commingled assets are netted against investment returns generated by SWIB's external fund holdings. It is important to consider costs in the context of value-added investment returns. For example, during the five years ended December 31, 2022, after consideration of all expenses, costs, and fees, SWIB generated more than $2.7 billion in additional profits beyond what would have been generated by the benchmark portfolio SWIB is measured against. These profits all go directly into the Wisconsin Retirement System for the benefit of its beneficiaries.

Attachment A provides a breakdown of the amount and percentage of assets managed under each type of dedicated and commingled account or partnership, and the change in the amount and percentage from the prior calendar quarter. As of December 31, 2022, SWIB's total authorized positions are 290 as shown in the table below.

Assets Under Management & Positions		
	9/30/2022	**12/31/2022**
Internal Management	46.4%	45.0%
External Management	53.6%	55.0%
Total SWIB Positions	**290**	**290**

In addition, Attachment B provides details of the services provided to SWIB and their associated quarterly costs. For definitions of the expense categories presented in the Total Cost of Management Summary table, please refer to Attachment C.

As new investment strategies are implemented and markets continue to evolve, SWIB will continue evaluating the most efficient means to manage the trust fund assets. Please contact us if you have any questions or comments about this report.

Sincerely,

Edwin Denson

Edwin Denson
Executive Director/Chief Investment Officer

Attachments
cc: Members, Joint Committee on Finance
Members, Joint Committee on Audit
Robert Lang, Legislative Fiscal Bureau
Joe Chrisman, Legislative Audit Bureau

ATTACHMENT A

Wisconsin Retirement System (WRS)	**3/31/2022**		**6/30/2022**		**9/30/2022**		**12/31/2022**	
	Amount (in millions)	Percent	Amount (in millions)	Percent	Amount (in millions)	Percent	Amount (in millions)	Percent
Internally Managed Assets	**$64,161**	**45.5%**	**$52,094**	**41.7%**	**$45,843**	**39.1%**	**$46,587**	**37.9%**
Externally Managed Dedicated Assets	**36,289**	**25.8%**	**27,907**	**22.4%**	**26,743**	**22.8%**	**29,344**	**23.9%**
Externally Managed Commingled Assets	**40,434**	**28.7%**	**44,852**	**35.9%**	**44,579**	**38.0%**	**46,979**	**38.2%**
1. Passive Index Funds	*2,283*	*1.6%*	*1,689*	*1.4%*	*1,711*	*1.5%*	*1,488*	*1.2%*
2. Limited Partnerships	*28,548*	*20.3%*	*30,212*	*24.2%*	*30,771*	*26.3%*	*31,719*	*25.8%*
3. Active Managed Commingled Assets	*9,603*	*6.8%*	*12,950*	*10.4%*	*12,097*	*10.3%*	*13,772*	*11.2%*
TOTAL WRS Assets	**$140,884**	**100.0%**	**$124,853**	**100.0%**	**$117,165**	**100.0%**	**$122,910**	**100.0%**
State Investment Fund - Internally Managed	**$16,930**		**$18,401**		**$17,876**		**$17,742**	
Separately Managed Funds - Internally Managed	**$111**		**$101**		**$93**		**$95**	
Separately Managed Funds - Externally Managed	**$2,095**		**$2,409**		**$2,438**		**$2,523**	
Total SWIB Assets Under Management	**$160,020**		**$145,764**		**$137,573**		**$143,269**	
Total Internal Management	***$81,202***	***50.7%***	***$70,596***	***48.4%***	***$63,813***	***46.4%***	***$64,423***	***45.0%***
Total External Management	***$78,818***	***49.3%***	***$75,168***	***51.6%***	***$73,760***	***53.6%***	***$78,846***	***55.0%***

ATTACHMENT B

STATE OF WISCONSIN INVESTMENT BOARD
Expenses for All Funds Under Management
Quarter Ending December 31, 2022

EXPENSE CATEGORY	SERVICE PROVIDED		EXPENSES
Internal Operating Expenses			
Staff Compensation	Staff Compensation	$	11,463,075
Fringe Benefits	Fringe Benefits		2,194,952
Equipment, Supplies & Services	General Supplies & Services		2,355,963
Total Internal Operating Expenses		**$**	**16,013,990**
Custodial, Investment Operations and Banking Fees			
BNY Mellon Asset Servicing - Custody	Master Custody Services	$	442,639
BNY Mellon Asset Servicing - Investment Operations	Investment Operating Services		1,246,427
Markit NA	Investment Data Management Software		272,385
Total Custodial, Investment Operations and Banking Fees		**$**	**1,961,451**
Legal Fees			
Chapman & Cutler LLP	Legal Work for Investment Strategies	$	239,320
Cox Castle & Nicholson LLP	Legal Work for Investment Strategies		91,660
DLA Piper LLP (US)	Legal Work for Investment Strategies		222,121
Godfrey & Kahn SC	Legal Work for Investment Strategies		42,895
Husch Blackwell	Legal Work for Investment Strategies		6,981
Latham & Watkins LLP	Legal Work for Investment Strategies		23,223
Legal Services Expense Accrual	Legal Work for Investment Strategies		(856,221)
Legal Payment	Legal Work for Investment Strategies		5,000
Nixon Peabody LLP	Legal Work for Investment Strategies		3,003
Purrington Moody Weill LLP	Legal Work for Investment Strategies		254,042
Quarles & Brady	Legal Work for Investment Strategies		231,017
Rutherford & Bechtold LLC	Legal Work for Investment Strategies		460
Shearman & Sterling LLP	Legal Work for Investment Strategies		35,000
Vedder Price PC	Legal Work for Investment Strategies		73,214
Total Legal Fees		**$**	**371,714**
Investment Counsel			
ABG Sundal Collier Inc	Investment Research	$	1,000
AE Business Solutions	Investment Consulting		18,000
Aksia LLC	Hedge Fund Investment Consulting		193,750
Alembic Global Advisors	Market Research		3,100
Alex Solutions	Research and Data Services		40,417
Algomi Corporation	Investment Consulting		16,117
Aon Hewitt Investment Consulting Inc	Investment and Risk Management Research		15,000
Apex Systems - CH25	Investment Consulting		52,351
Aquafold	Investment Research Software		898
Arthur Selender	Investment Consulting Services		18,000
B Riley FBR Inc	Investment Research		5,300
Backstop Solutions Group	Investment Software		111,605
Bank of America Merrill Lynch	Investment Research		71,500
Barrington Research Associates Inc	Investment Research		2,500
Barrons	Investment Research		274
BCA Research Inc	Global & Domestic Fixed Income Strategy Research		34,125
Berenberg	Investment Research		27,300
Blacklight Technology Partners, LLC	Research and Data Services		28,500
Blackrock Financial Management Inc	Risk Services		80,056
Bloomberg Finance LP	Market, Company, Industry & Benchmark Information		1,291,027
BMO Capital Markets Corp	Investment Research Services		13,500
BNP Paribas	Research and Data Services		39,250
BNY Mellon Asset Servicing - Custody	Master Custody Services		48,900
BNY Mellon Asset Servicing - Eagle/Pace	Investment Consulting Services		251,260
Bridge Consulting Partners Ltd	Investment Consulting Services		125,360
BTIG, LLC	Investment Research		4,500
Canaccord Genuity	Investment Research		5,400
Cantor Fitzgerald Investment Advisors, L.P.	Investment Research		3,100
CappThesis, LLC	Research and Data Services		2,500
Carahsoft Technology Corp	Investment Consulting Services		26,767
Carnegie Inc	Investment Research		500
CBJL Incorporated	Investment Consulting Services		100,040
CEM Benchmarking Inc	Investment Cost Analysis		41,800
CFRA Research	Investment Research Services		17,325
Charles River System Inc	Portfolio Management Trading Software & Services		383,451
CIBC World Markets Inc	Investment Research		2,500
CL King & Associates	Investment Research		7,350
Codrington Japan	Investment Research		500
Copp Clark	Research and Data Services		3,713
CoStar Portfolio Strategy	Real Estate Consulting & Research Services		28,738
Council of Institutional Investors	Corporate Governance		31,200
Cowen and Company LLC	Investment Research		23,700
Craig-Hallum Capital Group	Investment Research		3,700
CUSIP Global Services	Research and Data Services		16,250
Cutter Associates	Investment Organization and Systems Consulting		18,000
DA Davidson & Co	Investment Research		14,800
Dacheng Xiu	Investment Research		37,500
Daiwa Capital Markets America	Investment Research		5,500

EXPENSE CATEGORY	SERVICE PROVIDED	EXPENSES
Datacamp Inc	Research and Data Services	729
Davy Securities Limited	Investment Research	3,500
Deutsche Bank	Tax registration fees	46,500
DNB Bank ASA	Investment Research	5,000
Dow Jones News Service	Company and Industry News Services	32,466
DTCC – EPN	Trade Settlement Service	3,000
DTCC ITP LLC	Trade Settlement Service	2,087
EFront Financial Solutions Inc	Private Markets Portfolio Management Services	262,659
Elevation LLC	Research and Data Services	45,000
Empirical Research Partners LLC	Investment Research	137,500
Ernst & Young LLP	Tax Compliance Services & Investment Consulting	65,327
Euromonitor International	Research and Data Services	19,766
Evercore Group LLC	Investment Research	51,250
eVestment Alliance LLC	Research and Data Services	74,190
Exchange Analytics Inc	Futures & Swaps Trading Regulation Training	3,000
FactSet Research Systems Inc	Financial & Economic Database	926,696
Fairleads Strategies	Research and Data Service	1,875
FBN Securities, Inc.	Investment Research	4,000
Finiato	Research Management Solution	50,000
FIS Data Systems Inc.	Research and Data Services	30,646
Fitch Solutions Inc	Credit Rating Services	72,342
FTSE Fixed Income LLC	Real Time Index Data	38,610
Funston Advisory Services LLC	Consulting Services	14,500
Furey Research Partners LLC	Small Cap Research	10,600
Gallagher	Insurance and Risk Management Services	15,533
Goodbody	Investment Research	9,500
Green Street Advisor	Real Estate Analytics	16,937
Guggenheim Securities LLC	Investment Research	3,000
Haver Analytics	Global Macroeconomic Research	22,740
Ice Data LP	Fixed Income Indices	26,699
In Focus Information LLC	Private Placement Investment Research	1,500
Infopro Digital Services Limited	Research and Data Services	9,351
Institutional Investor	Investment Data and Research Services	24,500
Institutional Shareholder Services Inc	Proxy Voting Analysis	98,068
Intelligent Automation Consulting	Automation Consulting Services	25,350
International Swaps and Derivatives Assn	Derivative Industry Research	11,458
Investment Research Expense Accrual	Investment Research	(850,000)
Jefferies Research Services LLC	Investment Research	60,950
Keefe Bruyette & Woods (KBW)	Investment Research	17,500
Kepler Capital Markets Inc	Investment Research Services	5,000
KeyBanc Capital Markets Inc	Investment Research	23,450
Keystone Consulting Inc	Investment Information Technology Consulting Services	207,240
Kreischer Miller LLP	Investment Consulting	15,300
Law360 Legal News and Data	Investment Research	3,281
Liberum Capital Inc	Investment Research	10,500
Loop Capital Markets LLC	Investment Research	3,000
Mackey LLC	Research Management System	53,366
Macquarie Capital (USA) Inc	Investment Research	11,500
Manalo Advisors Limited	Research and Data Services	3,750
Markit Group Limited	Investment Consulting Services	7,470
Markit NA	Investment Data Management Software	27,500
Markit-EDM Limited	Investment Data Management Software	255,092
Matrix IDM, LLC	Investment Consulting Services	50,400
McLagan Partners Inc	Investment Compensation Data and Analysis	74,413
Meketa Investment Group	Public Markets External Manager Consultant	66,930
MKM Partners	Investment Research Services	4,700
MNI Market News	Research and Data Services	2,863
Moodys Analytics	Economic, Currency & Bond Analysis	80,237
Morningstar Inc	Industrial Sector Market Research & Analysis	6,000
MSCI Inc - Risk Metrics Solutions	Research and Data Services	348,744
MSCI, Inc	Research and Data Services	74,315
MUFG Securities America	Investment Research	9,500
My Data Outlet International, LLC	Research and Data Services	71,167
National Bank Financial Inc	Investment Research	1,500
National Conference on Public Employee Retirement Systems	Investment Research	4,660
Needham & Company LLC	Investment Research	6,800
NEPC LLC	Investment Consulting Services	50,000
New Street Research LLC	Investment Research	75,000
Northcoast Research Partners, LLC	Research and Data Services	2,500
Northland Securities	Investment Research	3,900
Novi Labs, Inc.	Research and Data Services	8,000
Novus Partners Inc	Profit & Loss Analytics System	18,885
Nuware Technology Corp	Investment Information Technology Consulting Services	139,184
NYSE Market Inc	New York Stock Exchange Data	6,386
Odeon Capital Group, LLC	Research and Data Services	3,000
Oliver James	Investment Consulting Services	64,936
Oppenheimer & Co Inc	Investment Research	10,000
Options Price Reporting Authority	Quote System for Options Market	2,625
Oxford Economics USA INC	Research and Data Service	8,154
Pac-invest	Research and Data Services	17,140
PEI Media Inc	Private Equity Real Estate News	995
Piper Sandler & Co	Investment Research	36,400
PremiaLab	Investment Research	79,113
Preyer	Investment Consulting Services	38,798

EXPENSE CATEGORY	SERVICE PROVIDED		EXPENSES
Raymond James	Research and Data Services		12,800
Redburn Europe Limited	Investment Research		9,750
Refinitiv	Research Pricing (Autex, Baseline, FirstCall)		203,612
Renaissance Macro Research	Macro Economic Research		21,000
Robert W. Baird & Co.	Investment Research		49,300
Rosenblatt Securities Inc	Investment Research		14,700
Roth Capital Partners	Investment Research		4,000
Rystad Energy AS	Investment Research		9,000
S&P Dow Jones Indices	Research and Data Services		54,405
S&P Global Market Intelligence	Industry & Corporate Research		105,825
SailPoint Technologies, Inc.	Information Security Software		19,470
Sanford C Bernstein & Co LLC	Investment Research		47,025
Seaport Global Securities LLC	Research and Data Services		14,230
SemiAnalysis	Investment Research		200
Sharp Decisions Inc	Investment Information Technology Consulting Services		81,872
Sidoti & Company LLC	Investment Research		4,700
Simcorp USA, Inc.	Investment System		(819,371)
SMBC Nikko Securities America Inc	Investment Research		4,500
Snowflake Inc	Research and Data Services		25,000
Solve Advisors Inc	Investment Research		10,000
Statista	Investment Research		118
Stephens Inc	Investment Research		10,950
StepStone Group	Private Equity Consulting Services		245,458
StepStone Group Real Estate	Real Estate Consulting Services		57,883
Steven N. Kaplan	Investment Consulting		7,500
Stifel Nicolaus & Company Incorporated	Investment Research		51,350
Susquehanna Financial Group LLP	Investment Research		1,500
SVB Leerink	Research and Data Services		7,000
SWIFT SC	Research and Data Services		326
SystemsAccountants	Investment Information Technology Consulting Services		76,800
Taranis, Inc.	Investment Information Technology Consulting Services		71,280
TD Securities (USA) LLC	Investment Research		2,500
Telsey Advisory Group	Consumer Sector Research		17,308
The Benchmark Company LLC	Investment Research		2,000
The Financial Times Limited	Investment Research		740
The Leuthold Group LLC	Broad Based Market Research		2,000
The Nasdaq Stock Market, LLC	Research & Data Services		4,500
The Yield Book Inc	Research and Data Services		9,332
Toronto Stock Exchange	Market Data		14,462
Totem Macro LLC	Research and Data Services		47,500
TradeWeb	On-Line Fixed Income Trading Services		10,188
Trahan Macro Research LLC	Research and Data Services		6,000
Trivariate Research LP	Investment Research		5,000
Truist Securities, Inc.	Investment Research		7,000
Tudor Pickering Holt & Co	Investment Research		1,100
Unit4 Business Software Inc	Financial & Administration Services System		72,224
Unquote	Research and Data Services		3,137
Vadim Moroz	Investment Consulting Services		67,500
Vertical Research Partners	Industrial Sector Market Research & Analysis		2,750
Verus Advisory Inc	Benchmarking Consulting Services		42,000
Virtu ITG Analytics LLC	Trading Transaction Cost Analysis		20,500
Visible Alpha LLC	Research and Data Services		25,633
Wall Street Journal	Investment Research & Information		51
Wedbush	Investment Research		5,500
William Blair & Company LLC	Investment Research		5,000
WIPFLi LLP	Income Tax Preparation Services		1,000
Wolfe Trahan	Transportation and Macro Economic Research		21,350
Wolverine Execution Services LLC	Options Trading Platform		1,395
WorldBridge Partners Inc	Recruitment Consulting		105,520
Worth Charting LLC	Investment Consulting		11,950
Yipit, LLC	Research and Data Services		(2,500)
Total Investment Counsel		**$**	**7,570,768**
Separate Account Public Market Management Fees			
Alliance Bernstein	Public Market Management Fees	$	1,320,091
Blackrock	Public Market Management Fees		1,520,086
Dodge and Cox	Public Market Management Fees		717,979
Driehaus Capital Management	Public Market Management Fees		16,477
eSecLending	Public Market Management Fees		2,972
Fidelity Investments	Public Market Management Fees		1,270,536
Parametric	Public Market Management Fees		(283,351)
Prudential Global Investment Management (PGIM)	Public Market Management Fees		5,382,535
Wellington Trust Company	Public Market Management Fees		2,284,361
Total Separate Account Public Market Management Fees		**$**	**12,231,686**
Securities Lending Agent Fees			
BNY Mellon Asset Servicing	Securities Lending Agent Fees	$	1,125,732
Total Securities Lending Agent Fees		**$**	**1,125,732**
Total Quarterly Charges to Funds		**$**	**39,275,341**

[1]All costs reported are on an accrual basis except for internal operating costs which are on a cash basis of accounting. Negative expense amounts are due to accrual adjustments and/or other miscellaneous adjustments.

Explanation of Expenses

Internal Operating Expenses

Internal operating expenses consist primarily of staff compensation and fringe benefits. SWIB employs a staff of professional investment and support staff to manage trust fund assets. Other internal operating expenses consist of office equipment, supplies, business travel, information technology equipment and services, and general services.

Custodial & Banking Fees

Wisconsin Certificate of Deposit Program: Under a contract with SWIB, Bankers' Bank administers the program under which the State Investment Fund (SIF) purchases certificates of deposit from Wisconsin-based banks and thrifts. Most administrative costs are paid by the participating banks. SWIB's expenses help underwrite other administrative costs, such as insurance that SWIB requires to be purchased.

BNY Mellon: Provides master custodial and administrative services (safekeeping of assets, income collection, valuations and accounting) for public and private domestic and foreign securities in the Wisconsin Retirement System (WRS), the SIF, and the other separately managed trust funds. In addition, SWIB receives performance measurement and analytical services through its contract with BNY Mellon, which serves as the official book of record for SWIB's accounting and performance measurement functions. BNY Mellon provides data and analytical tools used by SWIB for compliance and risk management. These include global collateral management, data management, and hosting services. Fees for these services are established by contract.

US Bank: The State of Wisconsin contracted with US Bank to be the state's working bank. The fees paid to US Bank by the SIF reflect bank service charges that are not directly applicable to the fund participants.

Legal Fees, Services, and Expenses

Under authority delegated by the Attorney General, pursuant to s. 25.18 (1) (a) Statutes, SWIB may employ legal counsel for any matters arising out of the scope of its investment authority. This includes legal services relating to bankruptcies, class actions, private markets transactions, fiduciary advice, securities law, investment litigation, and other similar matters.

Investment Counsel

Current law gives SWIB the authority to employ investment counsel in any matters arising out of the scope of its investment authority. Investment research and services provided include global market, industry, economic and company information, financial and performance analytics, news information, pricing and exchange data, credit ratings, financial modeling, economic forecasting, trading services, and a variety of Board consultations. These services enable SWIB to perform due diligence on current and future holdings and assist in monitoring investments.

Securities Lending Agent Fees

Securities lending programs generally earn income through the reinvestment of cash collateral posted by borrowers and through the collection of fees for loans where non-cash collateral is posted. SWIB's securities lending income is shared with the agent to pay the costs associated with the administration of the program. Securities lending agent fees are reported as expenses.

Externally Managed Separate Account Fees

External asset managers have been delegated authority within guidelines established by SWIB to determine investment strategy and purchase securities in SWIB's name within a SWIB account. Fees are typically assessed as a percentage of the market value of assets under management and in some cases, fees are based on investment performance.

External Funds Fees

SWIB invests in separate legal entities managed by external investment managers to gain exposure to select strategies including Public Markets, Private Equity, Venture Capital, Real Estate and Hedge Funds. In exchange for their investment management services, the external managers charge a fee within the entity they manage. Fees are typically assessed as a percentage of the market value of assets under management, commitments, and in some cases are based on investment performance. While the fees charged to these external vehicles do not meet the statutory definition of a cost or expense to SWIB, they are currently included in SWIB's total cost of management. Accordingly, these fees are reported as supplemental information.

Private Equity Fund Commitments*

October 2022 – December 2022

Investment	*Commitment (millions)*
Align Capital III	$67.75
American Pacific Group II	$50.00
Charlesbank Credit III	$75.00
KLH V	$50.00
Kohlberg X	$150.00
NGP ETP IV	$35.00
Percheron Capital Fund II	$75.00
Seaside Equity Partners II	$65.00
SPC Wilson Point	$150.00
Warwick Partners V	$60.00

**Includes Current Return Portfolio*

Private Equity Co-Investment Commitments*

October 2022 – December 2022

Investment	*Commitment (millions)*
Consumer Co-Investment	$40.0
Information Technology Co-Investment	$10.0
Consumer Co-Investment	$25.0
Utilities Co-Investment	$40.0
Consumer Co-Investment	$20.0
Healthcare Co-Investment	$25.0
Media/Telecom Co-Investment	$40.0
Information Technology Co-Investment	$21.0
Financials Co-Investment	$10.0

**Includes Current Return Co-Investment Portfolio*

SWIB STATE OF WISCONSIN INVESTMENT BOARD

Private Debt Investments/Commitments

October 2022 to December 2022

Investment	*Investment/Commitment*
Consumer Products/Grocery	$18,400,000
Total	**$18,400,000**

Real Estate Commitments

October 2022 – December 2022

Investment	*Commitment (millions)*
Total	**$0**

Funds Alpha Commitments*

October 2022 – December 2022

Manager	Commitment (Millions)
Mesarete	$ 200
Driehaus	$ 650
Brigade	$ 500
AHL Badger	$ 150
Badgerstone SRT	$ 150
Four World - Luz	$ 30
SoundPoint	$ 21
TOTAL	**$ 1,701**

**Includes Hedge Funds and Beta One*

Board Contact Log

DATE OF INBOUND COMMUNICATION	COMMUNICATION SOURCE	TOPIC
February 22, 2023	Ann Brummitt Climate Safe Pensions for Wisconsin	Fossil fuel divestment
March 3, 2023	Ludovico Lombardo	Investment opportunity in fine art market

This log records communications directed to SWIB's Board of Trustees. It is maintained pursuant to the procedures set forth at https://www.swib.state.wi.us/board-contact.

Board Meeting

Tab 13 - Future Items for Discussion

2023 Board Meeting and Agenda Plan

March 2023	
SPCG	**Open Session** • Real Estate Strategy Report and Market Outlook • Corporate Governance Program Update • June Investment Forum Preview • Project Centum Update **Executive Closed Session** • ED/CIO Goals Review
Audit & Finance	**Open Session** • Annual Charter Review • Open Audit Issues Report • Approval of Draft Audit Reports • Audit Plan Status • 2023 Internal Audit Goals • Financial Reporting • Administrative Reports **Executive Closed Session** • Evaluation of Internal Audit Director • Internal Audit Director Compensation
Compensation & Workforce Development	**Open Session** • Annual Charter Review • Recruiting Update • Strategic Results Scorecard Approval • Incentive Compensation Program Review • Scoring of Strategic Results Scorecard / Review Division Scorecards • Incentive Compensation Award Recommendations **Executive Closed Session** • Incentive Compensation Award Recommendation for Specific Individuals • ED/CIO Evaluation and Compensation
Board Meeting	**Open Session** • Committee Reports • Election of Secretary and Assistant Secretary • Annual Committee Assignments • Proposed Meeting Dates for Next Year • Investment Performance and Market Updates; Callan Peer Report (onsite) • Investment Committee Open Session Business • Quarterly Investment Update • Q4 Direct Charges to Funds / PMFA Commitments **Closed Session** • Risk Management Update • Investment Committee Closed Session Business **Executive Closed Session** • Incentive Compensation Award Recommendations for Specific Individuals

2023 Board Meeting and Agenda Plan

<table>
<tr><th colspan="2">June 2023</th></tr>
<tr><td>SPCG</td><td>Open Session
Hedge Fund Strategy Report and Market Outlook
Project Centum Update
Executive Closed Session
ED/CIO Goals Review</td></tr>
<tr><td>Audit & Finance</td><td>Open Session
Open Audit Issues Report
Approval of Draft Audit Reports
Affirmations and Disclosures
Audit Plan Status
Five-Year Audit Summary
Financial Reporting
Administrative Reports
Executive Closed Session
LAB Review of Statements of Economic Interest</td></tr>
<tr><td>Compensation & Workforce Development</td><td>Open Session
Annual Charter Review
Recruiting Update</td></tr>
<tr><td colspan="2">INVESTMENT FORUM</td></tr>
<tr><td>Board Meeting</td><td>Open Session
Committee Reports
Investment Performance and Market Updates; Callan Peer Report
Investment Committee Open Session Business
Quarterly Investment Update
Q1 Direct Charges to Funds / PMFA Commitments
Closed Session
Risk Management Update
Investment Committee Closed Session Business</td></tr>
<tr><td colspan="2">INVESTMENT FORUM</td></tr>
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2023 Board Meeting and Agenda Plan

<table>
<tr><th colspan="2">September 2023</th></tr>
<tr><td>SPCG</td><td>Open Session
Private Equity Strategy Report and Market Outlook
Corporate Governance 2023 Proxy Voting Review, ISS Update, and ESG Trends
Trustee Manual Review/Policies Update
October Workshop Preview
Project Centum Update
Closed Session
Annual Consultant Reporting
Security Management, IT, and Data Management Update
Executive Closed Session
ED/CIO Goals Review</td></tr>
<tr><td>Audit & Finance</td><td>Open Session
WRS Audited Financial Statements
Open Audit Issues Report
Approval of Draft Audit Reports
Audit Plan Status
2024 Audit Plan Preview
Financial Reporting
Administrative Reports</td></tr>
<tr><td>Benchmark & Performance</td><td>Open Session
Annual Benchmark Preview</td></tr>
<tr><td>Board Meeting</td><td>Open Session
Committee Reports
Investment Forum Recap
Biennial Ethics Training
Fiduciary Training
Public Records Training
Investment Performance and Market Updates; Callan Peer Report
Investment Committee Open Session Business
Quarterly Investment Update
Q2 Direct Charges to Funds / PMFA Commitments
Closed Session
Risk Management Update
Investment Committee Closed Session Business
Executive Closed Session
Board Self-Evaluation with Governance Consultant</td></tr>
</table>

OCTOBER BOARD WORKSHOP
• Outside Speakers • Asset Allocation review with Actuaries

2023 Board Meeting and Agenda Plan

December 2023	
SPCG	**Open Session** • Beta One Strategy Report and Market Outlook • Annual Charter Review • Project Centum Update **Executive Closed Session** • ED/CIO Goals Review
Audit & Finance	**Open Session** • SIF Audited Financial Statements • Open Audit Issues Report • Approval of Draft Audit Reports • Audit Plan Status • Strategic Plan Review • Proposed 2024 Audit Plan • Financial Reporting, including Budget and Position Request • Administrative Reports **Executive Closed Session** • LAB Review of Statements of Economic Interests
Benchmark & Performance	**Open Session** • Annual Charter, Policies, and Philosophy Review • Benchmark Consultant Report
Compensation & Workforce Development	**Open Session** • Compensation Philosophy Review • Compensation Consultant • Incentive Compensation Plan Changes for Next Performance Year • Incentive Compensation Projections • Annual RPM Review • People Metrics • Recruiting Metrics **Executive Closed Session** • Succession Planning
Board Meeting	**Open Session** • Committee Reports • Investment Performance and Market Updates; Callan Peer Report • Cost Benchmarking Report • Asset Allocation Recommendation • Quarterly Investment Update • Investment Committee Open Session Business • Q3 Direct Charges to Funds / PMFA Commitments **Closed Session** • Asset Allocation Implementation • Risk Management Update • Investment Committee Closed Session Business • Annual Review of Expected Tail Loss Analysis